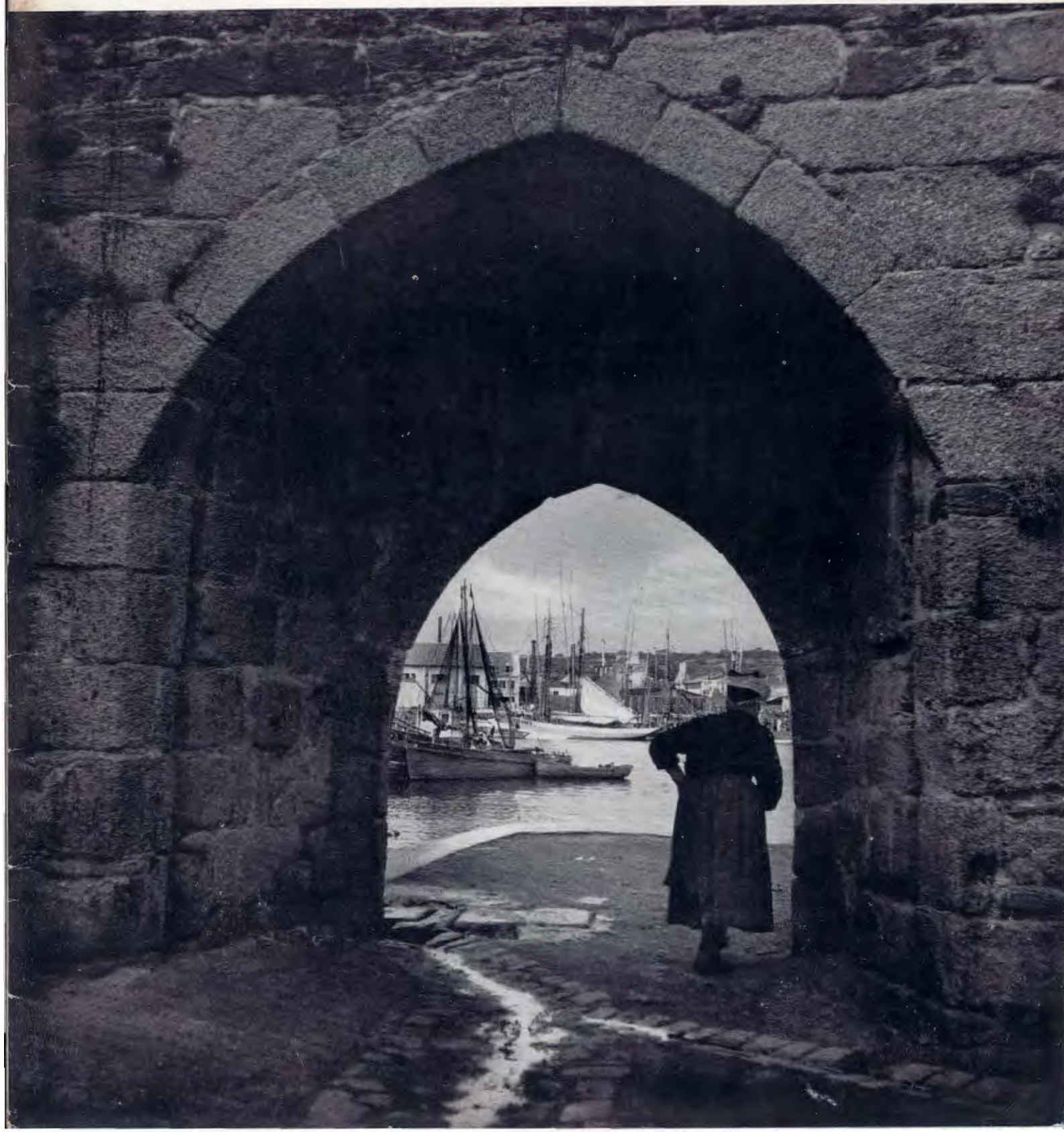




# MAGAZINE

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# THE I.C.I. MAGAZINE

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*Front Cover: Concarneau, Brittany. A camera study by Miss E. E. Atkins (Nobel House).*

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# TERYLENE

## The Fibre of the Future

By W. F. Osborne (Plastics Division)

Underwear that need not be ironed after laundering; skirts that keep their pleats indefinitely; blankets that can be boiled; tablecloths that require only to be rinsed to remove jam or ink stains—these are some of the boons of 'Terylene.'

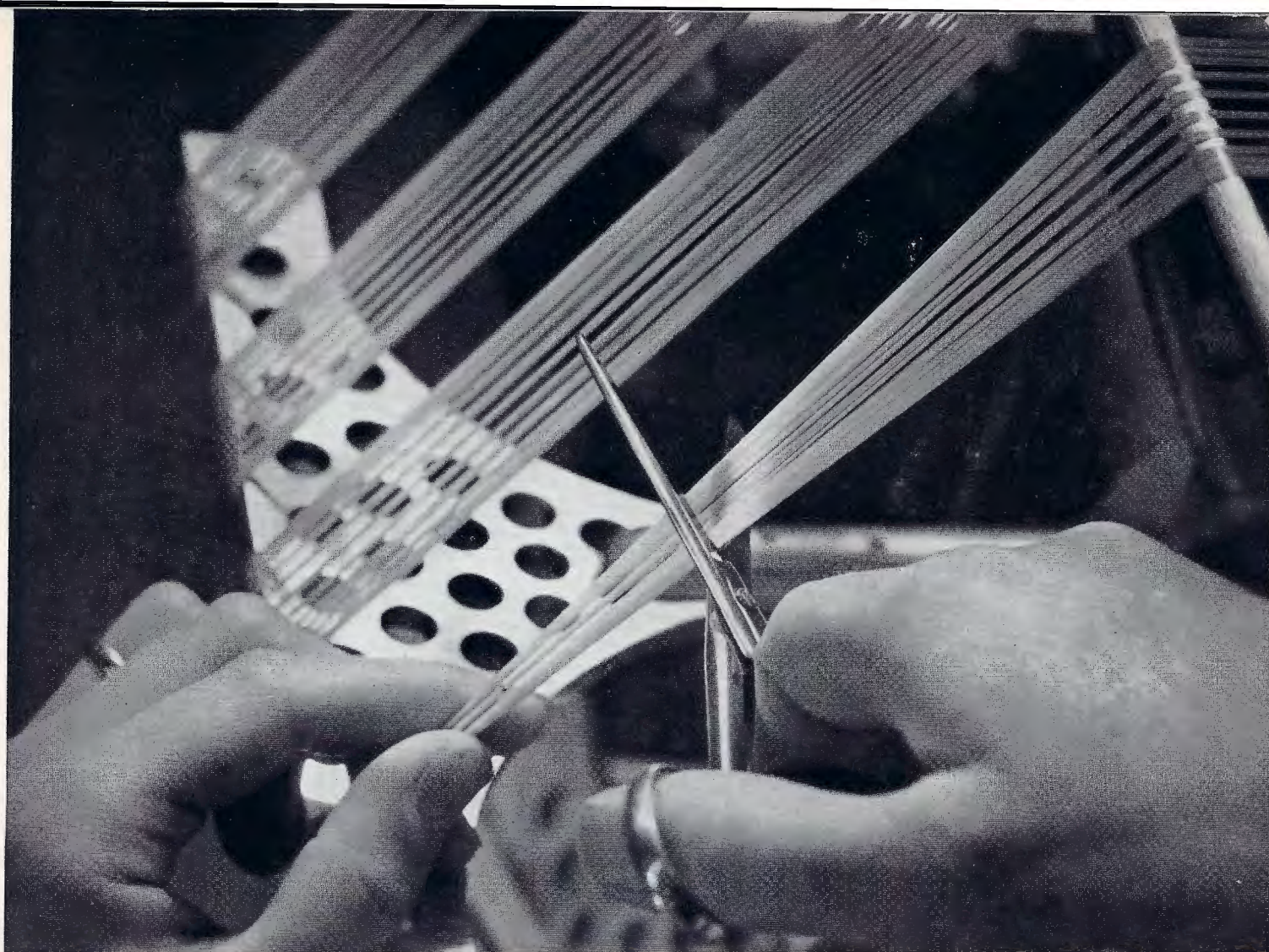
**B**y its announcement on 10th November, 1950, that a plant is to be built at Wilton for the production of 'Terylene' synthetic fibre I.C.I. has informed the world of its intention to enter a new field of development in the chemical industry. The rapid advancement of science achieved in modern times has brought with it advances in organic chemistry which have opened up wide fields of development of new materials.

Among these are synthetic dyes, drugs, plastics and new textile fibres, all of which are derived from naturally occurring raw materials such as coal, oil, water, air and limestone. The potentialities of this vast new field of endeavour excite the imagination. Here in 'Terylene' is a British synthetic fibre from which the British textile industry will be able to produce many beautiful and useful materials.

'Terylene' is the name given to a new chemical material derived from oil. It can be spun into fine filaments, and these can be combined to form threads or yarns from which textile fabrics of almost limitless variety can be woven or knitted.

The new plant at Wilton, which will take a few years to build, will have a capacity of 11 million pounds of 'Terylene' per annum made in two forms, namely continuous filament yarn and cut staple fibre. The nearest approach in nature to continuous filament yarn is silk, and the early rayons, then known as "artificial silk," were made exclusively in this form. It was found, however, that large quantities of waste yarn were being accumulated, and in order to use this up and so





SLEEK, SLENDER AND STRONG, 'Terylene' yarn has 1270 miles of filament to the lb. A known length of the yarn is here being cut for weighing.

reduce the cost of production the idea was conceived of chopping it up so that it resembled cotton or wool.

These short-length fibres are known as "staples," and rayon staple fibre is now being produced in its own right in increasingly large quantities throughout the world. Fabrics made from continuous filament yarn are smooth and silk-like in appearance, and in 'Terylene,' as in nylon, the high strength of the filaments enables very fine fabrics to be made. Fabrics made from staple fibre, on the other hand, have greater fullness and warmth, effects which can be enhanced by crimping the fibres.

'Terylene' staple fibres of different diameters and lengths and degrees of crimp can be carded and spun into yarn according to type in the cotton, woollen, worsted or flax systems, producing characteristically different yarns and fabrics.

Although the spinning of silk has been established in this country since 1585 when the sack of Antwerp drove many Flemish artisans to England, much the greater part of the British textile industry is organised to handle natural fibre staples such as wool and cotton. In manufacturing staple fibre I.C.I. will derive advantage in that the spinning of staple into yarns in their various degrees of complexity will be undertaken by the textile spinner, who is already equipped with the necessary machinery, whereas in the production by I.C.I. of continuous filament yarn there are the intricacies of yarn sizes,

filament counts, degrees of twist, types of package and other problems to be taken into account.

Furthermore, because a synthetic staple fibre such as 'Terylene' will be clean and uniform in dimensions and properties, many of the intricate and more unpleasant textile processes required for say cotton or wool can be eliminated. Also the manufacture of staple fibre, which can be sold in bale, offers advantages of bulk production on a small number of large machine units, contrasting with the multiplicity of spindles required in drawing continuous filament yarn and winding it on to bobbins.

### *A Wide Range of Uses*

Nevertheless there are expected to be important markets for 'Terylene' in the continuous filament form. The versatility of 'Terylene' is shown in the wide range of textile structures which can be made from it. These range from fine voiles, chiffons and lingerie fabrics to heavy canvases, wool-like blankets, and even ships' hawsers!

When the jupon of the Black Prince, still bearing in its tattered fabric traces of the Royal Arms of England after hanging for nearly six centuries over his tomb in Canterbury Cathedral, was repaired recently, 'Terylene' net was used as reinforcement because of its high strength and durability.

Most of the work done in appraisal and production to date



has been on continuous filament yarn, and only small quantities of staple fibre have so far been passed to the industry. Even supplies of continuous filament yarn have had to be severely rationed and most textile users have been given only a fraction of what they would like to buy, and only then if their work was of importance in appraisal. Supplies have been sent out in varying quantity to manufacturers of five classes of textile structures: woven fabrics, knitted fabrics, lace and net, braids and narrow fabrics, and ropes and cordage. In nearly all of these, products of acceptable commercial standard have been produced without much difficulty.

Only in weaving fabrics from the finer continuous filament yarns have serious difficulties been encountered, but these are steadily being overcome. Quite unexpectedly some of these difficulties arise from the high strength of 'Terylene,' which exceeds that of structural steel in tons per square inch. For instance, entanglements such as may occur in weaving are not easily broken apart as with rayon and natural fibres. In the manufacture of lace, entanglements have even caused damage to machinery.

The high strength of 'Terylene' has at times been the cause of wonderment to textile manufacturers. On one occasion a lace manufacturer demonstrated its strength by using a piece of four-inch lace insertion as a towrope for his car. This tough treatment failed to damage the material, even where the knots were tied!

The final arbiter of any new material is, of course, the purchasing public. It is not merely sufficient to have yards and yards of material woven up. The fabrics produced must be made up into articles to be sold over the counter and tested in use. This part of the appraisal has made slower progress because, of course, the textile manufacturer must first find out how best to exploit the novel properties of radically new materials such as 'Terylene.'

Outlets for textile fibres are in personal wear, household goods and industrial uses. For the last named, physical properties and performance are of greatest importance and appearance does not matter very much. For fabrics for personal wear and for certain household goods, which together make up by far the greatest outlets for textile materials, appearance is very important.

The first evaluation of the intending purchaser is a visual one, the eye being attracted by colour and draping properties. Then follows evaluation by touch, so that handle is also of great importance. Finally there are considerations of value, the price to be paid, the performance to be expected, how the material will stand up to wear, to laundering, to exposure to light and weather, and so forth. It can thus be seen that the ability to take up colour is of prime importance in these particular outlets.

In dyeing natural fibres or rayons the textile dyer takes advantage of the ability of the material to absorb moisture. The difficulty of dyeing 'Terylene' was at once appreciated when it was found that its moisture absorption was exceptionally

low, its regain—that is, the amount of moisture it can pick up from bone dry when exposed in an atmosphere having a relative humidity of 65%—being only 0.4%, compared with nylon at 4.2%, viscose rayon at 11% and wool at 16%.

This difficulty was regarded by the Dyehouse Department of I.C.I. as a challenge, and in due course a considerable degree of success was attained in dyeing 'Terylene' by methods within the scope of the ordinary commercial dyer. Uniform medium and pastel shades can be produced on 'Terylene' without major difficulty, but the dyeing of 'Terylene' to deep shades is not yet at a stage in which it can be entrusted to the commercial dyers.

Among the less conventional methods of getting colour into 'Terylene' is the dyeing of the polymer before it is spun. Dyestuffs Division have produced a range of new dyes which can be used in this process and which will stand up without degradation to the high temperatures involved. By this means 'Terylene' yarn and staples can be produced in bright attractive translucent colours, and the coloured staples can be blended with white or differently coloured staples to give an almost infinite variety of shade. This technique was introduced in this country by certain of the rayon manufacturers who have produced "spun dyed" rayon coloured with pigments. These, however, do not have the bright, attractive appearance of the dyes used in 'Terylene.'

Second only to colour in the eyes of the intending purchaser are the properties of drape and resistance to wrinkling. 'Terylene' is excellent in these properties, which can be enhanced by suitable heat-treatment of the fabrics during their manufacture. This method can be used also to give crease-retention. It is possible in this way to stabilise 'Terylene' fabrics so that made-up articles retain their shape indefinitely. 'Terylene' flannel trousers, for example, have retained a knife-edge crease after having been washed a dozen times or more.

Here is a startlingly novel property. Imagine a lady's woollen frock which can be boiled without damage and be ready to put on after the merest touch up with an iron, or flimsy pleated neckwear that can be washed without disturbing the pleats.

The property which we call handle is also of importance in fabrics for personal wear. Science has not yet been able to devise a means of measuring this elusive property, which still remains largely a matter of personal opinion, so that what seems a soft or "sympathetic"

handle to one individual is declared by another to be harsh or even repellent. It may therefore be considered highly satisfactory that the handle of 'Terylene' is thought to be warm and agreeable by most authorities in the textile industry. Indeed, only one seriously adverse opinion has been received, while many authorities rate the handle of 'Terylene' as outstandingly good.

Appraisal within the textile industry has up to the present been largely on operating and processing experience and there has been insufficient time, except in a few limited outlets, to

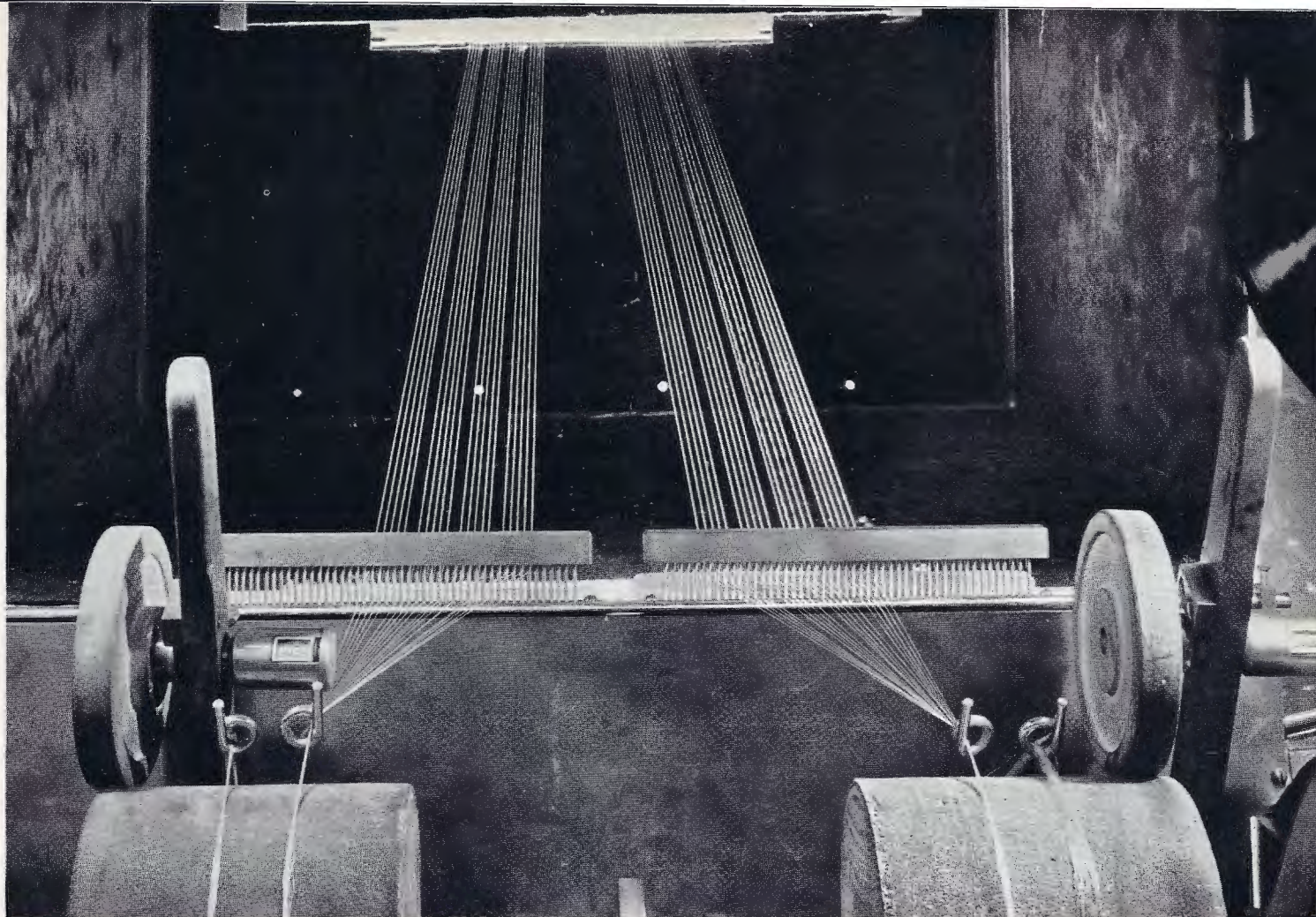


J. R. WINFIELD, who with J. T. Dickson discovered 'Terylene' in 1939



W. F. OSBORNE, who was in charge of development from 1944





SPECIAL TEST CHAMBER *through which samples of the yarn are run for visual checking*

obtain valid reports on performance in use. Our ideas on such performance therefore rest mainly on small-scale tests done in the laboratory. These tests are essentially simple in character, seldom more than one property at a time being examined. In actual use fabrics are often subjected simultaneously to complex and diverse reactions difficult to reproduce with any approximation of validity in a laboratory. Nevertheless the work done in the laboratory enables us to form a favourable opinion as to how 'Terylene' fabrics will behave in actual use.

First of all, the fabrics are strong and not easily torn or frayed, and the low moisture absorption makes them quick and easy to dry after laundering.

The wet strength and toughness of 'Terylene' are to all intents and purposes as high as when dry, and as it is not affected to any marked extent by oxidising agents, even at the boil, it is highly resistant to damage in the laundry—even of the most modern variety! 'Terylene' articles made up with sewing threads of other fibres have stood up to repeated launderings and have come apart only because of failure of the thread. In passing it may be mentioned that 'Terylene' (or Fibre V) sewing threads are being increasingly used in America for sewing nylon and other textile fabrics.

Shrinkage on laundering or wetting is, of course, of importance to the user, particularly irregularity in shrinkage, which causes cockling. This problem has been one of the most trying that the manufacturer of man-made fibres has had to face, as variations in shrinkage may be induced after it leaves his control by unskilful handling of the material in the manu-

facture of fabrics or making up of garments. To this extent I.C.I. is in the hands of textile operators, and all that can be done is to advise on how best to stabilise the fabrics by heat-treatments that eliminate or minimise shrinkage.

Attractive fabrics can be produced by blending or mixing 'Terylene' with other materials. Staple fibres, for instance, can be blended with natural wools or cotton to give union fabrics in which some deficiency in the parent material, e.g. low strength or abrasion resistance, is compensated for by the inclusion of a proportion of 'Terylene,' even as low as 10%. This can be done also with continuous filament yarn, either twisted or doubled with natural yarns or woven independently in the fabric.

### ***Blending with Other Fibres***

A fine thread of 'Terylene' can, for instance, be used as a support thread or core for a woollen or worsted thread to give it increased strength, the 'Terylene' remaining unseen in the centre of the fabric. Novel textile effects can be obtained by blending or weaving in 'Terylene' with other fibres, dyes being chosen which will leave the 'Terylene' unaffected or, conversely, which will dye the 'Terylene' only. Attractive damasks have been produced by using 'Terylene' yarns of different lustre in the same fabric.

'Terylene' has many valuable properties, high acid resistance, heat resistance, and so on, to commend it for industrial use, and these outlets are being fully explored. One valuable property appears to be resistance to sea water. This has been



effectively demonstrated by trials in the North Sea of a trawler "cod-end"—the part of the trawl net that finally secures the catch. Nets made from treated cotton seldom last out the month's trip at sea, but the 'Terylene' net was still quite usable after nine trips. No wonder the skipper did not wish to part with it!

Moths and other insects do not care for 'Terylene' as a diet. Even the soldier ants of Singapore treated it with respect when it was pushed into their nest, although they bit their way through when trapped. Rich bacterial soil does not rot it, nor does moisture, and it is immune to mildew and fungus. When used as a mosquito net over a baby's cot in Hong Kong it even resisted the baby's teeth. This is praise indeed and shows 'Terylene' to be no ordinary fibre!

For what, then, will 'Terylene' yarn and staple fibre be used? Almost the only uses for which it is clearly unsuitable are those requiring some measure of absorbency, e.g. towels and handkerchiefs. Fibre properties alone will not determine its ultimate end uses, for it is unlikely that 'Terylene' will ever compete in price with the cheaper natural fibres or rayons.

For a large part of the total market these cheaper fibres are entirely satisfactory. For instance, rayon is an excellent material for ladies' evening gowns, which quickly go out of fashion and so have a relatively short life. Apart from its possible use in decorative effects, 'Terylene' would be used only, if at all, in the higher-quality end of this market.

More probable outlets for personal wear are in underwear and nightwear, where durability and launderability are important, and in wool-like fabrics. Excellent lightweight worsted suitings made from Fibre V, the American 'Terylene,' have already been offered for sale in the United States.

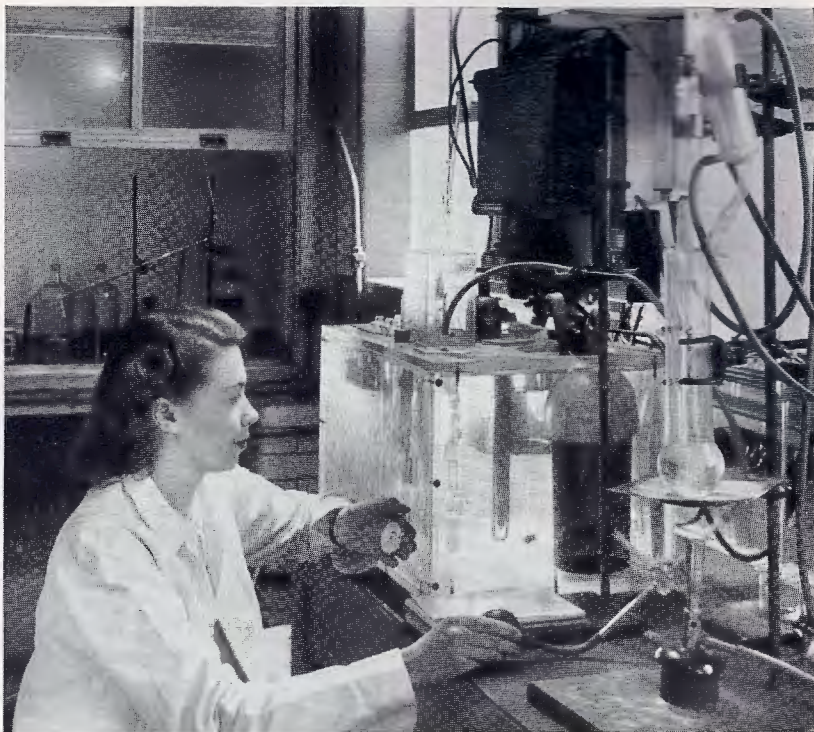
While the expert would no doubt detect the difference between these 'Terylene' worsteds and those made from pure wool, it is improbable that the ordinary layman would do so. In handle and appearance they are almost indistinguishable from wool, but they bring the added advantages of durability, resistance to shrinkage and wrinkling, ease of cleaning, and resistance to the effects of perspiration and attack by moths.

The prospects of 'Terylene' in the wool trade are becoming increasingly bright. The price of fine merino wool is already far above that visualised for 'Terylene' staple, and at time of writing there is no sign of a break in wool prices.

### Uses in the Home

The list of possible uses of 'Terylene' for personal wear and household use can be extended indefinitely—sports shirts that are always comfortable; tablecloths that require only to be rinsed to remove jam or ink stains; underwear that need not be ironed after laundering; blankets that can be boiled; socks that will not shrink; curtains, overalls, mosquito nets and upholstery fabrics.

In the industrial field the possible uses are also legion—electrical insulating fabrics, ropes and cordage, filter and press cloths, conveyor and transmission belts, and laundry bags. In certain Government defence projects of the highest priority



LABORATORY TEST OF THE POLYMER. *It is essential that viscosity should always be the same to ensure an even flow through the spinnerets.*

'Terylene' has been found to be the only textile material that can stand up to the extremely rigorous conditions of use.

The operation of the pioneer plants enables us not merely to study the reactions of potential customers but continuously to improve the methods of manufacture and above all the quality of the product. At every stage, from raw materials to polymer, the purity of the chemical intermediates is carefully determined and controlled, the standard demanded being higher than that for pharmaceutical chemicals. Similarly the finished yarn and fibre are subjected to exacting physical tests and inspection to eliminate faulty material. In every pound weight of 'Terylene' yarn as it is now made there are 1270 miles of filament. Every fraction of an inch of this must as far as is humanly possible be uniform in physical properties, size and colour, and the yarn package must be free from blemishes in winding or other damage.

As already stated, the proposed output of the first 'Terylene' unit to be put down at Wilton is 11 million pounds per annum. This is really a very small addition to the supply of raw materials to the textile industry, which if it had no other fibres available could consume the entire output in an afternoon.

Textile demand, already quoted in astronomical figures, is rising rapidly, faster probably than factories can be built or land put down under cotton, flax or sheep. Already world demand exceeds 20,000 million pounds per annum, the annual rate of increase being about 600 million pounds. With the present adverse dollar situation and the rising cost of existing fibres the future of synthetic fibres made from essentially indigenous materials is bright.

Eleven million pounds of 'Terylene' will hardly be noticed as a physical addition to textile supplies in this country, but its properties should ensure it a place of eminence even on this relatively small initial scale.



# Information Notes

## THE I.C.I. ACCOUNTS FOR 1950



By S. P. Chambers, C.B., C.I.E. (Finance Director)

*The Company's record earnings last year which led to an increased dividend of 2% were widely commented on in the national press. In this article Mr. S. P. Chambers explains where the money went.*

**D**URING 1950 I.C.I. and its hundred subsidiaries received £226 million from the sale of their products and as interest, dividends and other minor items. What was done with all this money? The following table, taken from the Annual Report, shows just what happened to the gross receipts in 1950; the figures for 1949 are put in for comparison:

This table shows the results in a simplified form and neglects certain points which we need not deal with just now. For example, the actual *cash* received was not exactly £226 million, because debts were outstanding at the beginning and end of the year. Let us look at the items a little more closely.

*Gross Manufacturing Proceeds, etc., £226 million.* The total receipts were £48 million more than in 1949 and are an all-time record. Part of this increase is due to the higher prices which have had to be charged to cover higher costs, such as increased charges for carriage, higher prices for coal, non-ferrous metals and other materials used. Some part is due to the extra pounds sterling obtained for sales in dollar countries since the devaluation of sterling in the autumn of 1949. The largest part is due to the increase in the actual volume of I.C.I. goods sold. The demand for some of these goods has been so great that although the factories producing them have been working all out they have not been able to keep pace with the demands of customers both in this country and overseas.

About one-fifth of I.C.I.'s gross receipts from sales of products made in Britain comes from exports. About one million pounds' worth of I.C.I. goods are exported each week, which is a very important contribution to the country's trade balance. In addition to this it has to be remembered that many

	1949 £ million	1950 £ million
Gross manufacturing and trading proceeds and gross income from investments, etc.	178	226
Raw materials, payments for external services (excluding wages and salaries), etc.	108	135
Wages and salaries .. .. .	43	47
Pensions .. .. .	3	4
Depreciation of plants .. .. .	6½	9
United Kingdom and overseas taxation ..	6½	13
Additions to reserves .. .. .	6½	13
Net dividends to stockholders .. .. .	4½	5
	<b>£178</b>	<b>£226</b>



of I.C.I.'s products, such as paint, leathercloth, metals, dyes, alkali and plastics, are used by other industries producing goods for export.

*Raw Materials, etc., £135 million.* Nearly two-thirds of the money received from the sales of I.C.I. products has to be paid out for raw materials, freight charges, fuel, electricity and other services which the Company buys from other concerns. Over this part of the costs the Company has very little control, although a constant battle is waged by the Central Purchasing Department and others to get the best materials on the best terms possible. In the manufacturing Divisions every economy in the use of materials, particularly coal, increases the margin of sale proceeds over costs; every economy increases true productivity.

*Wages and Salaries, £47 million.* This figure is up £4 million, or about 10%, over 1949. The total number of employees of all ranks was 104,638 by the end of 1950, which was nearly 4000 more than at the end of 1949, an increase of just under 4%.

*Pensions, £4 million.* The big increase of about a million pounds over 1949 is due mainly to further amounts set aside by the Company for the pension funds. As salaries rise and more pensions are payable at higher rates the amounts which the Company has to pay to the pension funds to keep them solvent go up.

*Depreciation of Plants, £9 million.* In addition to this £9 million a further £5 million is included in the figure of "Additions to Reserves, £13 million" towards the extra cost of replacing plant and machinery at current prices, making the total amount set aside for this purpose £14 million. This compares with £8 million for 1949 (£6½ million, plus an additional reserve of £1½ million). The whole subject of the amount which the Company should set aside for the replacement of its manufacturing assets is very important and is dealt with later on under the heading "Revaluation of Assets."

*United Kingdom and Overseas Taxation, £13 million.* This figure is nearly twice the amount for 1949. The increase is due to increased profits and to increased rates of tax. Included in the "Additions to Reserves, £13 million" there is a further taxation reserve of nearly £3 million which is set aside as representing the extra tax which will have to be paid in later years because of the special initial allowance given for 1950 in respect of new capital expenditure. From the tax bill for 1950 a deduction of £3 million has been made for a credit of this amount for some tax reserved in past years but now found to be not payable. Thus the true tax bill on the 1950 profits is nearly £19 million, which is more than one-third of the total bill for wages and salaries.

*Additions to Reserves, £13 million.* This is made up of the £5 million additional reserve for the replacement of plant, etc., to which reference has already been made, the £3 million special income tax reserve, and £4 million as a stock replacement reserve, a balance of about £1 million being the reserves made by subsidiary companies.

The reserve for stock replacement has been set aside because at least this amount of the profits is contained in the increased value of stocks due to the rise of prices during the

year. The point can be put another way. If stocks at the end of the year are the same in physical volume as at the beginning of the year but are shown at £4 million more because of the rise in prices, then £4 million is included in profits which cannot be distributed or paid away because it is needed in the form of stocks of raw materials, finished products, etc.

*Distributed as Net Dividends, £5 million.* This is the net amount paid out to preference and ordinary stockholders after deduction of income tax. The gross dividend on the Preference Stock is 7% before tax, and on the Ordinary Stock it is 12% for 1950 against 10% for each of the previous four years. £100 invested today in either the Preference or the Ordinary Stock at current market prices yields about 4½%. The dividend on the Ordinary Stock just before the war and throughout the war was 8%; the 1950 dividend at 12% is half as much again, but as prices have gone up by a much higher proportion, the Ordinary stockholders get less purchasing power out of their 1950 dividend of 12% than out of the 1938 dividend of 8%.

*Revaluation of Assets.* We must now turn back to the question of the amount set aside for depreciation of manufacturing assets (factory buildings, plant, machinery, etc.). The total of the amounts set aside out of the 1950 profits is much higher than that for 1949, and the main reason is that, as the cost of replacing these assets at today's prices is much higher than it was, a much larger part of the Company's trading receipts needs to be put aside for this purpose.

One of the duties of the directors is to see that the capital invested in plant is maintained and replaced when worn out or obsolete; otherwise there would be growing inefficiency, and sooner or later the whole process of production would come to a standstill. The usual practice is to set aside out of the proceeds of sales such sums year by year as will add up to the original cost of the item of plant when the time comes to replace it. Thus, if an item of plant cost £15,000 in 1938 and is expected to last fifteen years, from 1938 to 1953, and if £1000 is set aside each year, there will be a fund of £15,000 available for the replacement of this item in 1953. But if this replacement is going to cost about £45,000, which is probable, £15,000 will not be nearly enough. Rising costs of constructions mean that much larger sums need to be set aside for the replacement of worn-out and obsolete plant.

To find out how much needs to be set aside each year, the manufacturing assets of I.C.I. were revalued at 1st January, 1950, at 1950 costs, and an estimate was made of the number of years of useful life left in each item of plant or machinery. First the actual cost of new plant was calculated at 1950 costs and then a deduction made on account of the age of the existing plant.

When all this work of revaluation was done, the new values were put into the I.C.I. books. Then the new depreciation figures were worked out according to the estimated remaining useful life of each item of plant. The results were quite striking. The net value of these assets, after the deductions made on account of their age, goes up from £67 million to £163 million. The actual cost of replacing these assets in a brand-new condition is about £100 million more, making a total cost of replacement over £260 million. The depreciation charge of £9 million is calculated on the £163 million, and the extra £5 million is a further reserve towards the extra £100 million which may eventually be needed.



*The I.C.I. Balance Sheet.* While the Trading, Profit and Loss, and Appropriation Accounts give the story of what has been going on *during* the year—the production and sale of the products, etc.—the Balance Sheet gives a kind of photograph of the position at the year's end, 31st December, 1950.

This balance sheet reveals several important new features. Here is a rough summary; for accuracy and legal precision you must always go to the published accounts:

ASSETS	31.12.49 £ million	31.12.50 £ million
Land, Buildings, Plant, Machinery, Transport, Rolling Stock, Loose Tools, Furniture, etc. . . . .	69	180
Patents, Goodwill, etc. . . . .	15	15
Shares in and Advances to Subsidiaries and Associated Companies . . . . .	23	31
Stocks of Raw Materials, Finished Goods, etc. . . . .	37	41
Debtors, etc. . . . .	18	22
Marketable Investments and Tax Reserve Certificates . . . . .	2	8
Cash at Bankers and in hand . . . . .	4	6
	<b>£168</b>	<b>£303</b>
<b>LIABILITIES</b>		
<i>Capital</i>		
7% Preference Stock . . . . .	24	24
Ordinary Stock . . . . .	61	61
<i>Reserves</i>		
Capital Reserves . . . . .	17	118
Revenue Reserves . . . . .	22	26
Future U.K. Income Tax . . . . .	6	14
<i>Loans to the Company</i> . . . . .	1	21
<i>Current Liabilities, Creditors, Taxation, etc.</i>	37	39
	<b>£168</b>	<b>£303</b>

The outstanding feature of the Assets side of the Balance Sheet is the figure of £180 million for Land, Buildings, Plant, etc., against £69 million a year before. Of the increase of £111 million, £96 million is due to the revaluation, and the balance represents capital expenditure during the year in the erection of new plants £22 million less depreciation and amounts written off £7 million. The never-ending process of scrapping obsolete plant, erecting more modern ones to take their place, and building new plants for completely new products is all part of the task of keeping I.C.I. abreast of the times, equipped with modern plant and capable of meeting competition, particularly in its overseas markets. The year 1951 and later years will see a further expansion in the Company's capital expenditure upon new plants and new factories.

The £96 million increase in the value of the manufacturing assets has been credited to the Capital Reserves, which go up from £17 million to £118 million. Capital reserves are not, of course, distributable as dividends. When added to the capital of £85 million (£24 million and £61 million) they give a truer picture of the real worth of the Company.

The amounts set aside out of profits have not been enough

to pay for all the capital expenditure which the Company has been and is incurring. £20 million of new capital was obtained from the stockholders in 1948, and another £20 million was raised in 1950 as a loan from insurance companies and similar institutions. This second £20 million accounts for the increase of £20 million in the figure for loans.

That is the story for 1950. It reflects great credit on all who contributed to the results, whether they work in the factories, the sales organisation, in offices or overseas.

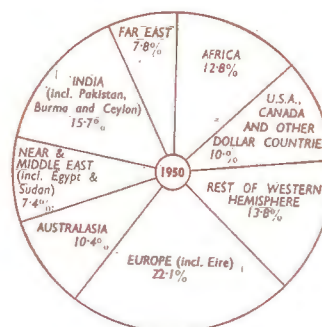
## I.C.I. EXPORTS: 1950

Contributed by Export Executive Department

In 1950 we had the benefit of devaluation for a full year, and all Divisions took advantage of the improved competitive position in which this placed them to expand their exports to a record figure of over £48 million, an increase of £10 million on 1949.

Nowhere, of course, was the benefit of devaluation more apparent than in I.C.I.'s dollar export drive, and in 1950 our dollar exports increased to £4.8 million as compared with just over £1 million in 1949.

*The countries to which I.C.I. exports have gone*



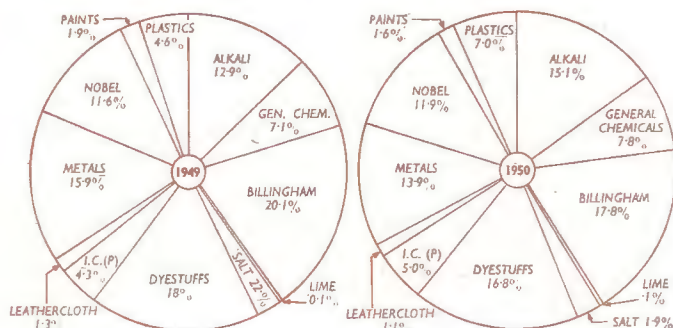
Since the war ended it has been the aim of I.C.I. to supply the requirements of its old traditional markets, especially the Commonwealth; to take the place of German exports, particularly to Europe; and, when the U.K. dollar export drive commenced, to contribute its full share to this very high priority trade. Fortunately, in 1950 I.C.I. was able to achieve all these objectives without detriment to any one of them. Our dollar exports expanded as shown, our exports to the Commonwealth increased by just under £3 million, and I.C.I. exports to markets in Europe by just under £1½ million. All these figures are compared with 1949, devaluation having taken place in September of that year.

The increase in exports was spread over the year, but the rate was greater in the second half, particularly during the last quarter. In the first half of the year some of our traditional markets were still restricting imports, but after June, under the stimulus of the Korean war, there was an upsurge in demand for all I.C.I. products from all markets. Indeed, in the last quarter of the year it was quite impossible to meet in full the sudden and greatly expanded demand for our exports, because by that time home trade demand generally had increased and the rearmament programme had started. Moreover, raw material shortages were occurring, and by the end of the year stocks of goods available for export were exhausted.



It will therefore be a very difficult task to maintain in 1951 the high level of exports which was reached in 1950. It was the excellent rate of production generally in 1950 which enabled the record exports of that year to be made. In 1951 we will only be able to match this performance provided we have the necessary raw materials and the same high level of production is kept up, assisted, as it is expected to be in the latter half of the year, by new plants coming into operation.

*How the Divisions contributed to I.C.I. exports*



## TRADE WITH MEXICO

Contributed by American Department

Since the end of World War II few countries have made more economic progress than the Federal Republic of Mexico. Its proximity to the U.S.A., its natural resources of metals of all kinds, its growing petroleum industry and its extensive cotton plantations probably constitute the main reasons for this rapid expansion. Mexico has been fortunate, too, in having a very able President during the last few years and has enjoyed a period of political stability which has done much to increase the confidence of businessmen all over the world. There has been a steady flow of U.S. dollars into the country and the Mexican peso has now become hard currency, being freely convertible with the U.S. dollar.

The considerable rise in the standard of living of the Mexicans over the past ten years has been coupled with an increase in culture generally. As in all countries, there is a certain amount of illiteracy, but an increasing proportion of the population is being given the opportunity to acquire a sound education. Mexico does not forget that they can boast the first university and the first printing press in the Western Hemisphere.

The most important industrial area in Mexico lies in the region of Monterrey in the extreme north. Here are iron and steel foundries; a cigarette factory; the largest brewery in the country; and a big glassworks, which incidentally is obtaining much of its requirements of soda ash from Alkali Division. Monterrey itself is a fine and prosperous modern city, strongly influenced by the North American way of life yet preserving much of its Spanish colonial tradition and architecture.

There are still vast undeveloped expanses of the country not yet under cultivation due to lack of sufficient rainfall and suitable means of irrigation, though this problem is being energetically tackled by the Government. The soil, in the main, is good, and on the west coast large areas are devoted to the growing of sugar-cane and tomatoes. In the south there is an

abundance of tropical fruits such as mangoes, pineapples, alligator pears, papayas, oranges and zapotes, and there are also numerous coffee, cocoa and banana plantations. Various kinds of cereals are grown in large quantities, particularly Indian corn, as it is the basis of the Mexican *tortilla*, the native substitute for bread. The State of Yucatan is supposed to grow about seven-eighths of the world's sisal, used in the making of rope and sacks. In spite of all this, Mexico's agriculture is still inadequate to meet domestic demands, and some commodities, notably wheat, have to be imported.

One of Mexico's important sources of income is the tourist trade, and the present Government has done much to encourage and attract visitors from all over the world. The great variety of scenery and entertainment to be found makes it a popular choice for holidaymakers, especially from north of the border. There are resorts to suit every taste, and the pleasures to be enjoyed vary from tropical surf-bathing, sailing and fishing in beautiful Acapulco, only an hour's flight from the capital, to skiing and mountain-climbing on nearby snow-covered Popocatepetl and Ixtaccihuatl.

To increase our contribution to the dollar drive and to help meet the increasing demand for essential chemicals from Mexican industry, a branch of I.C.I. (Export) has been set up and is operating in Mexico City, dealing primarily with the sale of dyestuffs and pharmaceuticals. Other I.C.I. products, notably alkalis, metals, plastics and heavy chemicals, are already being sold through a number of representative agents.



We in I.C.I. are convinced that Mexico is entering a period of great industrial activity and expansion. We have not in the past been able to make any appreciable headway in this market because of the cheaper prices and quicker delivery offered by her northerly neighbour. Since the devaluation of the pound in September 1949, however, our position has been considerably strengthened. Sales in 1950 were higher than ever before.

Provided supplies available for export are not too much curtailed by increasing demands at home, we are hoping that 1951 will be another record year.





## FILMS FOR FARMERS

By K. J. Richards (I.C.I. Film Unit)

**I**N the last three years the Agricultural Film Unit has concentrated on making films about grass. Grass produces for us quantities of milk, and from milk we get butter and cheese; it also produces large quantities of beef and lamb, wool and leather, and many other minor products. So far we have concentrated on making films about increasing production from grassland.

Five films have been completed in this series. Their titles are: *Mechanised Silage Making*, *Feeding Dried Grass for Milk*, *Co-operative Grass Drying*, *Good Hay hath no Fellow* and *Profit from Experience* (about controlled grazing). In these films we have tried to show how better grassland management can increase the farmer's profits and at the same time make a vital contribution to the country's food.

Agricultural films normally consist of at least 90% of exterior shots. This is one of the main difficulties in a climate such as ours. The best-laid schedules are often soaked with rain and trodden in the mud many weeks after the film should have been finished.

It is difficult to write a dramatic visual story, or any visual story at all, when all you see is blades of grass disappearing into the buccal cavities of a flock of sheep or a herd of cows. But we go to great lengths to make our stories flow and to hold the attention of the audience. In our film about haymaking we began by showing how hay was made in Shakespeare's time and how vitally important it was in those days. The Elizabethan parts in this film were taken by a group of farm workers and lecturers at Seale Hayne Agricultural College in Devonshire. With the aid of a barrel of cider the rigor mortis expression which their faces donned as they slipped their legs into the hosen was soon dispelled. Rapidly the atmosphere became as merry as it would have been in seventeenth-century England with the same stimulus.

A major problem in making agricultural films is the seasonal nature of farming. Very often we cannot afford to miss a shot

even if the weather is bad, as it may necessitate waiting for a whole year. But it is good to have problems, and it is good to overcome them, for after all farming itself consists of this.

## DESIGN FROM CRYSTAL STRUCTURE

Contributed by Leathercloth Division

Of interest to those now visiting the Festival of Britain will be the work of the Festival Pattern Group. This group, of which the Leathercloth Division is a member, has, under the leadership of Mr. Mark Hartland Thomas, Chief Industrial Officer of the Council of Industrial Design, been successful in arranging for a number of leading manufacturers to produce a new range of attractive and exciting designs in a diversity of materials. These are extensively used in the furnishing and decoration of many parts of the exhibition. Their inspiration comes from the patterns of crystal structure diagrams—the maps which a scientist draws to record the different arrangement of the atom in particular materials.

The project began in May 1949, when Mr. Hartland Thomas attended a course organised by the Society of Industrial Artists. One of the most notable papers read was that of Professor Kathleen Lonsdale on crystallography. In it she commented on the possibility of using crystal structure diagrams as a basis for textile designs. Later, Mr. Hartland Thomas, working with Dr. Helen Megaw of Girton College, Cambridge, compiled a number of crystal structure maps, and issued an invitation to twenty-six leading manufacturers to work under the direction of the Council of Industrial Design as the Festival Pattern Group. These maps provided a new source of inspiration for designers in industry, and the Leathercloth Division's contribution is based on the work of the Division Designer, Mr. C. C. Garnier.





*The pattern of the leathercloth of these seats is inspired by the crystal structure of insulin*

The work of the Festival Pattern Group can be seen principally in the Regatta Restaurant on the South Bank; in the Science Exhibition at South Kensington; and in the Land Travelling Exhibition. The Leathercloth Division has made a substantial contribution, designing and producing materials for use as upholstery and mural decoration.

## THE HIGH COST OF NEW PLANT

By W. Robson (Engineering Services Section)

We are all familiar with the continued rises in prices for foodstuffs, clothes, houses and general domestic requirements. The general public is, however, inclined to overlook the fact that the same trend is evident in all industrial development. In this respect I.C.I. is no exception.

Soon after the war the Company decided to prepare a cost index for the construction of complete chemical plants. This is kept up to date each quarter. The graph given opposite shows how the costs of construction have varied from 1926 onwards. The base year was taken as 1938, which was the last full pre-war year in which normal conditions prevailed. It will be noted that by the end of February 1951 the costs had risen to nearly three times those of 1938. Unfortunately, this is by no means the peak.

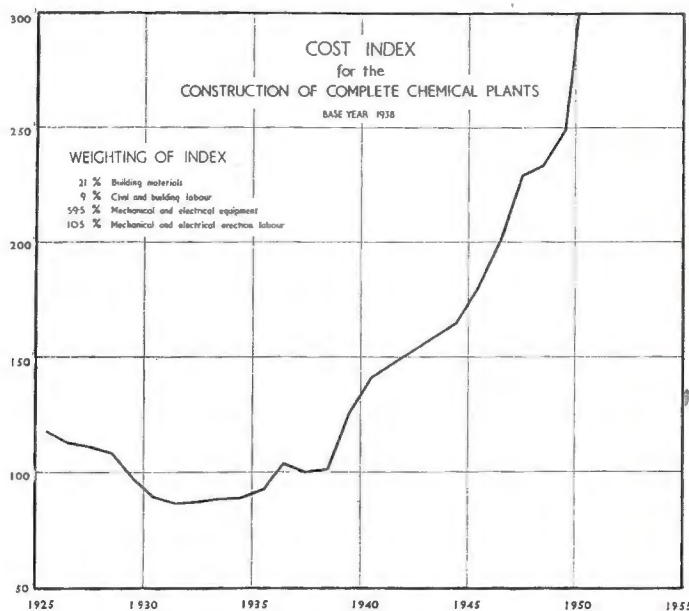
In building up the data for this graph, two sections of work had to be considered: (i) civil engineering and (ii) mechanical and electrical engineering. In each case, materials, plant and labour had to be taken into consideration and suitably weighted in preparing the sectional graphs. These sectional graphs were then in their turn weighted to form the graph for the complete plants. The chemical plant index has been proved by the Divisions to be a reasonable guide on how costs for a wide range of chemical plants have risen during the post-war years.

The materials costs are taken from widely published statistics issued by the Government and the adjustments in wages rates are obtained from the Ministry of Labour. In the latter case, allowance is made for any increased production efficiency which may have been achieved from time to time.

The factors which cause this general rise are, of course, manifold. In many cases they go back to raw materials, some of which at first sight may appear only remotely connected

with chemical plant construction. To illustrate this point no better raw material can be chosen than coal. A rise in the price of coal has an immediate effect on the costs of manufacture of steel, which is of course the basis of most chemical plant. Roughly two tons of coal or coke are consumed in the manufacture of each ton of raw steel. In addition, further coal or other services derived from coal (such as gas or electricity) are consumed in shaping the steel to the desired form, in driving the various kinds of workshop equipment used for fabricating the plant, for the transport of the steel from the mills to the fabricating shops and of the equipment from the fabricating shops to the I.C.I. site. It will be appreciated, therefore, that the direct and indirect extra costs which are involved and are reflected in the cost of equipment are many times the actual rise in the price of coal itself. Rises in wages in many of the manufacturing industries, as well as in I.C.I.'s own erection labour, have, of course, a direct effect as well.

Generally speaking, chemical plant has not as great a working life as plant used by many other industries. Due to the much greater level of research and development new processes are constantly being devised for manufacturing existing products more economically, new products are being found and, owing to the corrosive nature of the majority of the processes, plant does not last so long. The need to replace or modernise plants and to build new factories is therefore always pressing. Today, it involves us on the average in more than £5000 capital expenditure for every man employed on new work.



Increased costs for capital goods must be taken into consideration in fixing the selling prices of our finished products, as it is in this way that we must build up the greater proportion of the funds for financing schemes of this kind. In spite of the alarming increases in plant costs, I.C.I. has, thanks to its progressive policy, been able to develop its production resources and yet maintain the selling prices of its products at a reasonable level. This is demonstrated clearly by the fact that the I.C.I. Home Sales Index at the end of 1950 had risen to only one and a half times the 1938 figure, whereas the Chemical Plant Index had risen to nearly three times the 1938 figure.



# Three Chairmen

## Of Workers' Representatives at Central Works Council

*Drawn for the Magazine by Bert Thomas*

ON the day preceding each autumn meeting of the Central Council the workers' representatives on the Council elect from among themselves a chairman to hold office for twelve months, and elections to this responsible position are usually very keenly contested. The successful candidate then has the arduous duties not only of presiding at the meeting which the workers' representatives hold among themselves before joining with the management representatives for the full meeting of the Council, but also of

assisting the chairman of the Central Council in securing efficient and orderly discussion of the various matters which arise.

Election to this office implies that the workers concerned have shown powers of leadership and debate, not only within their own Division but also in the more testing atmosphere of the Central Council. It may also safely be assumed that they are men with an appreciation of the service which they can render to their fellow workers and to the Company through their enthusiastic co-operation in the Works Council Scheme.

C. Morris held office from May 1946 to May 1948; T. McCall from November 1948 to May 1950; and W. E. Brown of the Dyestuffs Division was elected in November 1950.

**Cyril Morris** of Metals Division is Swansea born; and Swansea remains his home. He came into I.C.I. by way of Vivian & Co., with whom he completed his apprenticeship as a patternmaker in 1912, and that firm's subsequent absorption into British Copper Manufacturers and thence into I.C.I. gives him a record of thirty-nine years' service.

For eighteen of these years he has been a prominent member of Landore Works Council, and his period of office in connection with the Central Council was perhaps a particularly arduous one, since it covered the immediate post-war years, when many important matters were discussed and sound methods of procedure established.

He is a man who gives enthusiastic support to anything that will better the lot of his fellows, and in view of his abilities and genial personality it is not surprising to learn that at one time he was serving in no fewer than twenty voluntary capacities at once. High on the list of these he rates his work for St. Jude's Church, Swansea, of which he is People's Warden. But he is perhaps more widely known as the popular and hard-working chairman of the South West England and Wales Patternmakers' Association and a delegate of the Welsh Engineers and Founders Conciliation Board. He has also given extensive support to the Savings movement and is a member of the West Wales Advisory Savings Committee.

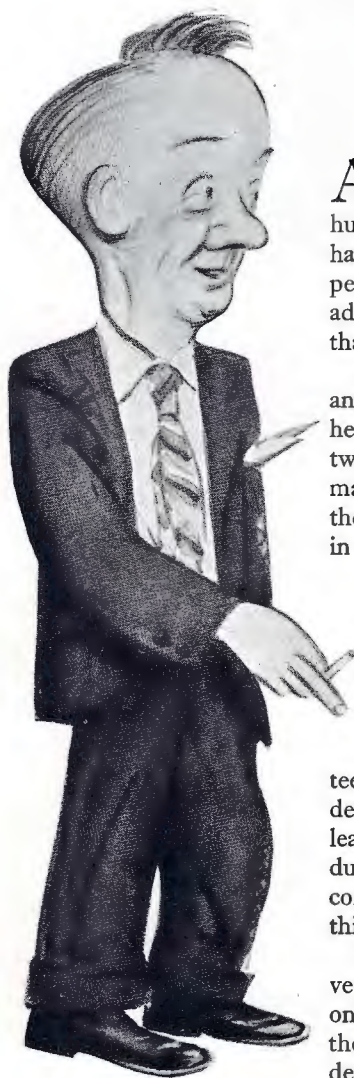
The demands on his leisure hours do not prevent him from maintaining a keen interest in cricket and Rugby football and in playing bowls at Cymdonkin Bowls Club, of which he is a committee member. During the first world war he was a corporal rigger in the R.F.C.





### Tom McCall

(Nobel Division)



AN energetic and quiet man who also possesses a sense of humour and fun, Tom McCall has a friendly, sympathetic temperament. Most frequently he is addressed as Tommy and likes it that way.

He came into I.C.I. in 1938 and would tell you candidly that he wishes his start had been twenty years earlier. A diffident manner conceals the purpose in the man, as those who meet him in debate realise. He argues well, but he also listens well. He is quick to concede debating points and adjust his viewpoint to recognise new facts. These qualities make him a valuable member of committees and his services are in demand. He believes that I.C.I. leads in matters of good industrial relations and that joint consultation has contributed to this happy state.

Thirty-six years ago he was a very young soldier (he is now only 53)—Private T. McCall of the 1st Battalion Scottish Borderers. On 25th April, 1915, he was one of the landing party at

the Dardanelles. This experience is etched deeply in his mind. Later, during the July offensive, he was badly wounded and brought home to England. Restored to health, he returned to the Services and campaigned in Egypt and Salonika.

After demobilisation Tommy McCall, like many other young men, felt an urge to wander and got a job as third cook on a hospital ship carrying wounded Australians and New Zealanders home. This leisurely voyage he remembers as one of the highlights of his life.

When he returned he gave up the sea and for fifteen years was employed in Glasgow Transport Department, where his interest in trade unionism developed. While living and working in Glasgow he played golf of a quality which led to a Western Union handicap of 4 and made him captain of Glasgow Tramways team in a match against London Transport. Nowadays he plays no golf.

His leisure is full, nevertheless. Whenever possible he likes to watch a good football match. Time for this relaxation, however, is not always easy, because he is the active chairman of his local trade union branch and there is always something to be done. Within Ardeer he serves on many sub-committees and he is a member of the Ardeer Recreation Club Executive Council.

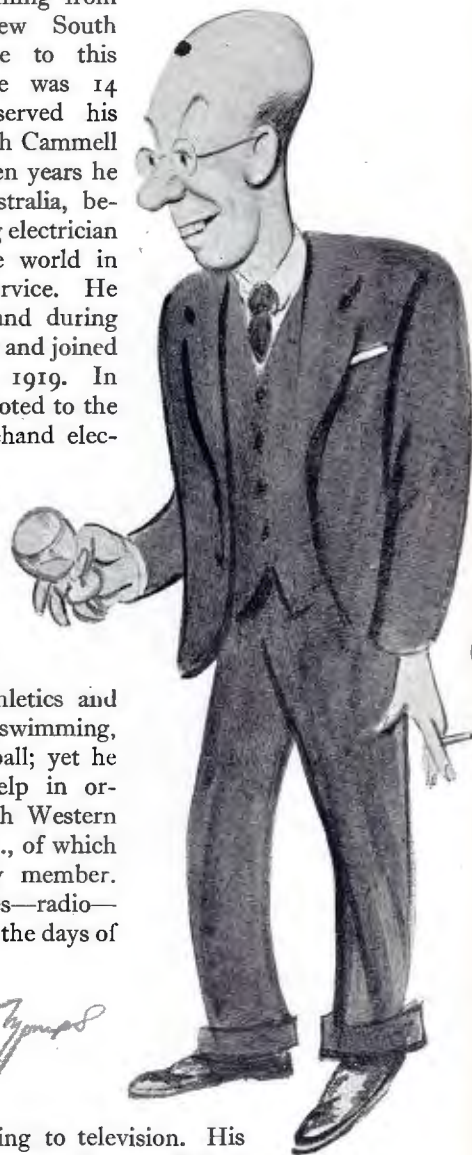
AFTER sixteen years as a works councillor it is perhaps natural that **Billy Brown** leading personality in Blackley Works Council and Dyestuffs Division Council affairs, should be a wholehearted believer in the Works Council Scheme and all it stands for: he cannot speak too highly of its purpose.

He was a member of the first council at Blackley Works and represented the workers at the first Division Council in 1929. At different times he has served on all sub-committees and acted as a sick steward for the Friendly Society during his first four years of office. Consistent seriousness of mind combined with a down-to-earth attitude have been his outstanding characteristics during these years. To borrow a phrase from Mr. Churchill, he might perhaps be christened Lord Root of the Matter.

Although his frankness and powers to present the case of workers have always been appreciated by the management, Billy Brown is reticent about his own deeds. By birth he is an Australian, coming from Golbourn in New South Wales. He came to this country when he was 14 years old and served his apprenticeship with Cammell Lairds. After seven years he went back to Australia, becoming a sea-going electrician and travelling the world in the Merchant Service. He returned to England during the first world war and joined the Company in 1919. In 1941 he was promoted to the position of chargehand electrician.

Like many of us, his outside interests have changed with the passage of time. In his early days he achieved local prominence in athletics and won medals for swimming, running and football; yet he found time to help in organising the North Western Area of the E.T.U., of which he became a key member. One of his hobbies—radio—has persisted since the days of crystal sets. He builds his own sets and component parts.

Now his thoughts are turning to television. His interest in radio, however, is not sufficient in itself to occupy all his leisure, and much of his spare time is given to motoring.







Illustrations by RIX

# Weekend in Delaware

By Alf Baldwin (Dyestuffs Division)

**T**HE young American physician put his stethoscope away and looked at me owlishly through his gleaming rimless spectacles. "There is nothing whatever wrong with you, sir," he said, "that a good rest won't cure. There is a little blood-pressure—nothing much. But mainly you are suffering from nervous exhaustion. When you come to think of it, it is not surprising. First there is the excitement of your trip over here, and then, when you get here, there is the change of climate, change of diet, scores of new people to meet, talking business, on your toes all the time—and not sleeping very well, I guess. Why, it's a natural! You got a touch of blood pressure and nervous exhaustion and you need a complete rest—well away from Noo York, for choice. Wadya doin' this week-end, for instance?"

I explained that I was planning to stay with some friends out in the country in Delaware.

"That's fine!" said the doctor. "Just the ticket! Mind you get to bed early and, above all"—he fixed me with his spectacles again—"take it easy. Yes sir, take it easy! I'll see you when you get back."

Later that same afternoon my good friend Ansko met me at the station in his beautiful car. Don't ask me whether it was a Cadillac, a Studebaker or a Nash. I wouldn't know. All I know is that it was slinky comfort on four wheels, and as we sped smoothly along the country roads towards Ansko's home I sat back and purred with pleasure. The doctor was right. This was what I needed.

As we went along Ansko told me that his wife, Olga, had arranged a small dinner party in my honour. Just a few friends and neighbours—there would be a party of eight. Then, while I was basking in the warmth of the implied compliment, he said, "By the way, Alf, how do you go for dogs?"









"Dogs?" I said.

"Yeah, sure—dogs. Are you at all nervous of dogs?"

This question made me laugh very heartily. You see, my father, until the day he died, had been a most enthusiastic amateur dog breeder, and my childhood, and indeed young manhood, had been enlivened by a background of airedales, bedlington, bull terriers, retrievers, cocker spaniels, red setters, and heaven knows what—all breeds of dog. I had graduated in the treatment of distemper, ear canker and worms and had taken post-graduate courses in rat-catching. To ask me, of all people, whether I was nervous of dogs! That was very gravity-disturbing, to be sure.

"Well," said Ansko, "that's fine. Because we've got a dog. At least, he's Olga's dog really. He's a boxer. He's a bit on the big side and looks sorta fierce, and some people reckon to be scared of him. But he's just a kid, really. Wouldn't hurt a fly. In any case he never even looks at strangers. They mightn't be there for all he cares."

"Look, Ansko," I said, "I am not—repeat not—nervous of dogs."

"That's fine!" said Ansko. "Just fine!"

We arrived at Ansko's home and I met my charming hostess and the other dinner guests.

"Where's Jerry?" asked Ansko.

"He's out in his kennel, dear," replied Olga. "I didn't want him bouncing around in here when we had company."

"You're durn right!" muttered Ansko, and we addressed ourselves to the cocktails. Then we went in to dinner, and it was very pleasing to discover that Olga, as well as being easy to look at, could cook also. The bulk of the conversation was

inspired by the sympathetic enquiries of my fellow guests regarding austerity in Britain, and I, being the only spokesman of Mr. Attlee's Government present, was doing my level best for him. Then, when I was in the middle of an explanation of why Mr. Churchill had not been returned to power, the french window was roughly thrust open and I heard the unmistakable click, click of a dog's claws on the hardwood floor of the dining-room.

"Doggonit, Olga!" said Ansko. "That sonofawitch has gotten off his chain!"

"Where's the harm in that?" asked Olga indignantly. "Lambie-pie just wants to see who's here, that's all. Just take no notice of him, folks, and he'll soon settle down."

We remained rooted to our chairs while the canine footsteps circled the table twice. On the second time round I caught a good look at the animal and got the shock of my life. He had a body like a sack of flour, front legs like drainpipes and a head the size of a soccer ball. Still, obeying my hostess's injunction to take no notice of the creature, I was commencing to outline Britain's attitude towards the hostilities in the Far East when I became aware of a great weight on my right thigh. I looked down to find that Jerry had placed his massive head on my lap and was looking up at me with great bloodshot eyes.

Such a demonstration of affection had never been awarded to a stranger, and I found myself being regarded by Olga with a new respect. I tickled Jerry's ear and he rewarded me by sneezing and blowing my napkin clean across the room. Then with a sigh of deep content he put both paws on my knee and tried to get his head on as well. Now I haven't got enough knee for that, and besides, I was now taking a good half of the dog's weight and was commencing to sag somewhat.

This was too much for Ansko—not to mention me—and, remarking that it was too bad if a man had to come all the way from England only to be mauled around by a doggone dawg, he seized Jerry by the collar—it was studded like the gate of Newgate gaol, I remember—and dragged him out into the garden.

The rest of the conversation at dinner was dominated by Olga, who just simply could not understand why Jerry had made such a fuss over me, since it was his unvarying custom to "play the chill" for strangers in no uncertain manner. I theorised that generations of bedlington and airedale had probably left me with a certain aura that Jerry could recognise, and so on and so forth.

Then we all went into the lounge for coffee and liqueurs. Try to picture us. Seven Americans and one Englishman, all on our best behaviour, indulging in very high-toned conversation, all resolved to put the world right, outlining global strategy and administering severe punishment to Ansko's stock of liqueur brandy. As a visitor I was given a far more courteous hearing than I ever get at home, and with my back to the empty fire grate, glass in one hand and cigarette in the other, I was getting some profound thoughts off my chest. Then in came Jerry again.

Completely ignoring his devoted mistress, Ansko and the other guests, he made straight for me and, placing his massive paws on my chest, licked my face with a tongue like a restaurant carpet, unshipping my specs, which fell into the fireplace. I joined them a split second later and Jerry was pulled off by his outraged master and thrown out via the french window, which was then locked.

What Ansko didn't realise, of course, was that Jerry was using another way into the house, and I had hardly finished dusting



myself off and laughingly assuring Olga that it was nothing at all—just nothing at all—when he was back again. He went straight into his paws-on-chest routine, but this time with a difference. One paw slipped and got inside the top of my pants. His whole foreleg followed—don't ask me how—and there we were. He seemed to think I had played some dirty trick on him, and his frantic struggles to release his leg soon had me in the fireplace again, where I was tossed around like an old cleaning rag.

After Jerry had been disentangled from my trousers and put on the chain attached to his kennel—"That'll fix you!" said Ansko—I picked myself out of the fireplace a second time. One of my fellow guests observed that I should be in good shape for playing Santa Claus when I got home. I did not join in the polite laughter which greeted this sally nor in the political discussion which followed but sat moodily considering what the doctor had said about the treatment for nervous exhaustion.

The next day, which was Sunday, I saw nothing whatever of Jerry. Hoping that he had strayed or had died in the night I enquired about him, but Ansko said he was roaming the countryside looking for skunks. "The only dawg in these parts that aint afeered of skunks," he said proudly. "But it can be a durned nuisance when he catches one, though," he added thoughtfully. I could see his point, of course, and wondered wistfully why the skunks hadn't had the wit to gang up on Jerry. But I suppose one cannot expect too much brain in skunks.

I said I never saw him that day, but that is not strictly true. Just as I was going to bed he came bounding along the corridor, literally drooling with affection. I got my door shut just in time. The thought of Jerry in bed with me gave me goose-pimples. I little realised that I was to have the next best thing.

Next morning I had a date in New York at 11.30, but on looking at my watch when I woke up I realised I couldn't possibly make it. Hearing me moving around, Olga called from her bedroom to say that Ansko had gone out but would be back shortly and that she, Olga, would be up and get my breakfast at once if I wished. I said I would sooner wait until Ansko returned, but could I in the meantime make a call to New York? Why, of course I could, and the telephone was right next to the Kelvinator in the kitchen.

So I, like a blithering idiot, nipped into the kitchen in my

pyjamas and made my telephone call. I put the phone down and turned to go back to my bedroom. There was Jerry, standing in the doorway, looking at me with his head on one side and with an unusually silly expression on his face.

We looked at each other for perhaps ten seconds. Then he advanced playfully and I made one of my major mistakes. I fetched him a sharp box on the ear. Any ordinary dog would have skated a couple of yards on the lino with the clout I gave him—and no doubt called it a day—but not Jerry. Jumping to the conclusion that I was in the mood for a morning romp, he was on me.

One swipe severed my pyjama string and with the other paw he held me down while giving me a good lick all over. There was one difference from Saturday's performance. I wasn't in the fireplace this time. Olga, who doubtless could hear a confused medley of doggy woofs and Lancastrian cursewords issuing from the kitchen, commenced to come downstairs, observing briskly that it sounded as if "you two boys have got together at last."

We were together all right. At that particular moment, his giant teeth gripping my pyjama jacket, Jerry was lugging me round the lino like a toboggan. I implored Olga to stay where she was, whatever happened, for reasons the methodical reader will appreciate. Then I set to work to break off the encounter, as the military strategists put it. But the more frenzied my efforts to escape the more Jerry entered into the spirit of the thing. He was wellnigh insane with joy. As for me, my pyjamas were in ruins and my torso was red with bruises and slippery with dog-lick. Despairing, I appealed to Olga to try to start up some counter-attraction. Could she not shout "Skunk" or something?

Well, whether she did or not or whether Providence intervened at that moment I shall never know, but Jerry suddenly leaped off me as if I were a red-hot stove and was off into the garden—lickertysplit! I crept into my bedroom and locked the door.

Later that day, when I got back to New York, I went straight round to see the doctor. He sounded me carefully and sat back with a smile. "It sure is gratifying," he said, "when patients do just what they're told. You've had a nice restful week-end in the country and, doggone it, you're a noo man—just like I said." He punched me playfully in the chest and I handed him five dollars.





# Take One Canoe

By Danny Reed (Alkali Division)

**F**EW hobbies, if any, can equal that of canoeing for the peace and serenity which it brings amid the wonders of nature, wonders which are missed in any other way.

Whether you are the tired businessman, the hard-pressed working man, or just another henpecked husband, a trip along the river in a canoe will restore those shattered nerves, and those gigantic problems that beset us all will recede into the background.

Come with me now and we will explore those unfrequented backwaters and streams where only a canoe can get; where every day is a Sunday, and only the "arrak" of the water-hen heralds your approach.

There is a good north-west breeze blowing, so we will hoist the sail and sit back. How gently and silently yet how swiftly we scud along, the bows throwing a gentle spray to port and starboard. Now a pleasure craft comes speeding along towards us, throwing a wash a foot high; the bows rise gracefully to take the first roller, then, with a gentle rocking motion, we pass swiftly on through the now broken waters.

I wonder to myself, do those people realise just what they are missing? Perhaps they don't care—I feel a little sorry for them. Here the river bends to the left: that puts the wind on our port side and calls for an adjustment to the sail. Having no keel, we depend entirely upon correct and skilful manipulation of the sheet to capture and utilise every ounce of wind, not only to keep us in motion but also to prevent us from being blown too close to the bank, thus fouling the rudder in the soft mud and perhaps capsizing us altogether.

The sail, I would like to explain, is called a Bermuda rig and is suspended from a collapsible mast slightly forward of amidships; a line running through a small pulley at the top supports the sail and wind-weight and is fastened astern to a gulley that is controlled by means of a wooden slide. Thus if the wind blows really hard the gulley line is tightened by simply pushing the wooden slide up, thereby easing the strain on the mast.

The boom at the bottom of the sail is secured to port and starboard by two adjustable lines; these lines can be adjusted to give the sail "belly" or to take it up tight in a stiff breeze or to turn the sail into the wind, enabling the canoe to maintain its momentum.

The canoe is 16 ft. from stem to stern and built after the fashion of the Eskimo kayak. She will seat three people comfortably. She is constructed of oak, cane and canvas. Although light, she is amazingly seaworthy and manœuvrable, having



the advantage over heavier craft, by reason of her shallow draught, of being able to sail in very shallow water. This advantage is probably best appreciated when out duck-shooting. As so often happens when shooting on the broad shallow Cheshire Flashes, one brings a duck down and the wind blows it into a clump of reeds where the surrounding water is too shallow for a dog to retrieve it. The mud just under the surface may be anything up to three feet deep, and the stench of decomposed vegetation is almost overpowering. Many a succulent mallard has been lost in these circumstances. With a canoe this would present no problem at all and one's prestige would suffer no setback, as there would be no "big fish" story to tell to a doubtful audience at home.

At this little white bridge we come to the course of the old river. This is my favourite spot. Here the branches of the trees form a green canopy where on the hottest day it is





delightfully cool and fragrant and the perfumes of the flowers mingle and blend to produce that glorious scent so peculiar to the English countryside.

As we drift lazily along with the current the waterfowl and birds seem to have temporarily lost their inherent fear of man and allow us to approach quite closely; overhead the cautious wood-pigeons coo their plaintive messages to one another and flap noisily from branch to branch. Here a stream of fresh spring water flows into the river; in its upper reaches one may gather armfuls of crisp delicious watercress or quench one's thirst.

The rabbits on the far bank don't seem to mind our intrusion

as they nibble unconcernedly at the lush green grass or sit up to peer inquisitively as we drift silently along.

In the distance a church bell rings and a cowman calls the cattle in from the fields for milking. Here are peace and serenity as God himself must have planned them.

Gradually the trees thin out and the handiwork of man becomes more apparent. I always feel a little sad when I leave my haven, but I know that I will return again and again, and I am comforted. There are many backwaters and tributaries of the river Weaver such as this, where larger craft cannot go because of weeds and shallow water.

It's fascinating to sit still and watch the antics of the quarrelsome waterfowl, and sometimes at the time of year, if you are very quiet, you may observe a disturbance in the reeds on the far side of the river; then a wild duck will appear. She will make quite sure that no danger lies in wait, then swim out into open water followed by eight or nine ducklings in follow-my-leader style. If you accidentally betray your presence the mother duck will immediately take wing and the ducklings, who are fully feathered, will dive beneath the surface and swim to the nearest clump of reeds or perhaps a willow. There they will lie totally submerged except for their bills, which protruding among the broken twigs, in order that they may breathe, look for all the world like dead sticks. Once in this position they will not move no matter how much noise or disturbance you create; indeed one requires extremely keen sight to detect them at all, so perfectly do they match their natural surroundings. If you do see one it is a simple matter just to grasp the bill, and there you have a nice fat duck. It would be as well to let it go again when you have examined it, though the temptation is hard to resist, especially when the thought of green peas persists provocatively in one's mind, for the law prescribes severe penalties for anyone taking a bird this way, and rightly so.

A good canoe is expensive, but a suitable craft can be constructed at home for as little as £5. All one needs is roughly 128 ft. of birch lath (this can be bought from any wood merchant without a permit), an ex-army bivouac or any other suitable canvas, plus patience and a little ingenuity. A useful tip to remember if you are thinking of building your own canoe is never to use steel screws or bolts, as these soon rust; brass, copper or any non-ferrous screws will ensure a more lasting job. I think there is a lot more satisfaction derived from cruising in a canoe that you have built yourself.

This year I intend to stow my gear, a gun and a camera into my canoe and travel as far as I can in a week in the direction of London by canal.



# I.C.I. NEWS

## THE PRESIDENT AT GLASGOW

"Glasgow should never relax its efforts to get new industries, light industries, making the commodities that are required in the everyday life of our people, and for which there must always be a certain demand," said Lord McGowan, Honorary President of I.C.I., in his speech, acknowledging the honour conferred upon him by his native city when he received the freedom of the City of Glasgow in the City Chambers on 19th April. Glasgow must do this, he said, to cushion the depression that is bound to follow when the Clyde shipyards are short of orders.

Glasgow had the facilities for the creation of such industries, he continued, and said he believed that it was the duty of all local councils to encourage their creation by offering attractions, maybe in rates or in other directions.

"It is not for me," said Lord McGowan, "to say what form these facilities should take; but would it not be well to encourage American interests to erect factories in this area? I instance the Americans in particular because money for big capital commitments will, I fancy, be short in this country for some time to come. Our huge rearmament programme will absorb much finance that would otherwise have gone into industry. The Americans not only have the money, but they are enterprising, always reaching after something new. They are much more disposed to try new discoveries, new inventions, new labour-saving devices and new gadgets for household use—much less conservative, I regret to say, than we are in these all-important respects."

Lord McGowan said that looking over the names of those

similarly honoured by his native city he found he had become a member of a corps d'élite. He added that, although in a full and active life he had been the recipient of a number of honours, no honour was greater to a man than that bestowed

by his "ain folk." "My cup of achievement, which I thought to be full," said Lord McGowan, "is today brimming over."

In a racy reminiscent speech, in which he recalled his boyhood days in Glasgow and his first job as an office boy with Nobel's Explosives Company, Lord McGowan traced for his hearers Glasgow's trading and industrial history. While emphasising that "the heart of this ancient seat of industry and learning is as sound as a bell," he pointed out that Glasgow had discovered that the "road of life is paved with heavy reversals." He said that as a trading and industrial organism Glasgow had had the ground swept from under her time and time again, her staple industry of the moment destroyed. "The fact that she has always fought back," said Lord McGowan, "the fact that she has overcome circumstances that have obliterated many another city, is the main reason why I, as an industrialist, have come to reverence her and her people."

He paid a compliment to "the magnificent manner" in which Glasgow had for many years administered her affairs "to the advantage of her million inhabitants," but insisted that while Glasgow men occupied leading positions in many parts of the world it was at home that her "men of parts" were most needed.

"As I see it," he said, "the only thing that Glasgow badly



*Lord McGowan, the Lord Provost of Glasgow and party leaving the City Chambers after the ceremony*



needs at the moment, in order that she may carve out a decent future for a million souls, is—peace. There is no disguising the fact that the year in front of us is going to be a very difficult one indeed. In every heart, in every home, in every community from Camlachie to Clerkenwell, the same anxiety gnaws at people's hearts, darkening the firesides.

"No one can tell whether we shall be able to pursue our peaceful ways, threatening none, or whether the power-greed of men unrestrained by any accountability to their people will force us once again into a struggle for our survival as a free nation. Of course, I am referring to the men in the Kremlin. All I do know is that 'the strong man armed keepeth his palace,' and that the future must be dark indeed for this city, for this country, for us all, if we do not rapidly build up sufficient military power to deter any would-be aggressor. It will entail burdens—maybe heavy burdens—on all of us, but there is not one of us who will not shoulder the load to secure a future for our children."

Lord McGowan said it was inspiring to look back over the great cavalcade of men—Glaswegians by birth or training—who have added to the cultural and material heritage of their city, their country, and often of the world.

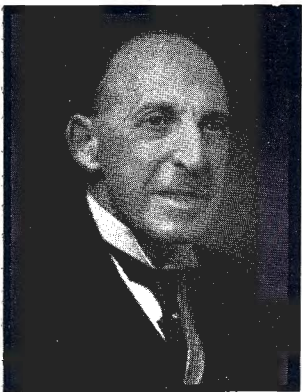
He ended by paying tribute to Lady McGowan, who was present at the ceremony, saying that her affection, her courage, her comradeship and her counsel throughout the years had meant more to him than he could express.

"Had I not enjoyed the priceless advantage which such a consort represents," he said, "I am quite sure I could never have been thought worthy of the honour that the City of Glasgow has done me this day."

Lord McGowan received the casket with his Burgess Ticket from Lord Provost Sir Victor Warren.

### **Mr. H. A. Humphrey**

*Mr. F. H. Bramwell, Chief Engineer, General Chemicals Division, has written this appreciation of Mr. Humphrey.*



I feel it is a great honour to be asked to pay a tribute to the memory of such an outstanding engineer as Mr. H. A. Humphrey, and one who has been so closely associated with our Company since he first joined Messrs. Brunner, Mond & Co. Ltd. (one of the constituent firms of Imperial Chemical Industries Ltd.) over sixty years ago, in 1890.

Mr. Humphrey had a splendid analytical brain and a magnificent memory; he was fortunate in his technical training,

as after studying at the Finsbury Technical College under Professors Perry and Ayrton he moved on to the Central Institution in South Kensington (now the City and Guilds Engineering College) in 1885, where as one of the original five students at that time he had the advantage of close and intimate association with those leading teachers of the day, Professors Unwin, Ayrton, Armstrong and Henrici.

On leaving college Mr. Humphrey spent a short time with Messrs. Heenan and Froude in Manchester before joining Messrs. Brunner, Mond & Co. Ltd. in 1890. His ability, keenness and freshness of outlook were quickly appreciated by

Dr. Ludwig Mond, the founder of the firm, who employed him in connection with the many new processes then being developed. His work at Winnington in connection with Mond gas producers and large gas engines led, under Dr. Mond's encouragement, to his setting up in practice as a consulting engineer in London in 1901, at the early age of 33.

For the next thirteen years Mr. Humphrey gained an unrivalled experience of chemical and general engineering by the numerous visits he paid to plants and works in many parts of the world in connection with his professional duties; his reputation became world wide and his circle of friends and contacts a large one.

It was during this period that Mr. Humphrey invented the Humphrey gas pump, and the successful installation of four large pumps at the Chingford Reservoir by the Metropolitan Water Board led to his name becoming so well known in engineering circles throughout the world.

In 1914 he put his wide knowledge and experience at the service of the country, and as Technical Adviser to the Department of Explosives Supply (a department of the Ministry of Munitions) he played a great part in ensuring the supply of ammonium nitrate for the prosecution of the war.

Later in the war, while with the Munitions Inventions Department, Mr. Humphrey investigated the various known processes for the fixation of nitrogen; this resulted in the Department of Explosives Supplies starting the construction of a factory at Billingham for this purpose, using the Haber process. The end of the war in 1918 halted this project, but largely owing to the perseverance of Mr. Humphrey the site was acquired by Messrs. Brunner, Mond & Co. Ltd. This is now the Billingham factory of Imperial Chemical Industries Ltd., one of the largest single chemical factories in the world and one of the major Divisions of the Company.

Mr. Humphrey was appointed as consulting engineer for the Billingham project and later, on the formation of Imperial Chemical Industries Ltd. in 1926, for the whole of the combined Company, a position he held until his retirement at the end of 1931.

One of the most important projects with which he dealt during these later years was the construction of the boiler and power plant at Billingham in 1928-9, at that time well in advance technically of normal central power station design in this country.

After his retirement Mr. Humphrey continued as a consultant to Imperial Chemical Industries Ltd. and also gave freely of his knowledge, time and energy for the benefit of the various engineering institutions of which he was a member.

For the past three years Mr. Humphrey has been living quietly in Hermanus, Cape Province, South Africa, with his wife. Even there he continued to live a full and busy life, occupying himself with local affairs. He also fitted up a well-equipped workshop, where he spent most of his spare time.

As one who worked very closely with Mr. Humphrey during the early years at Billingham, and later as his deputy in London, I grew to appreciate more fully his splendid qualities, both technical and human. While guiding the original Billingham team, dealing with the many new and complicated problems inseparable from an adventure of that magnitude and nature, his wide experience was made fully available to us all and was of the greatest possible value; his kindness, patience and consideration for others were qualities that endeared him to us all.

Outside the works he and Mrs. Humphrey did much to



ensure that close friendly family atmosphere which meant so much to us in those days.

Mr. Humphrey will be missed greatly by all who had the privilege of knowing him, and the sympathy of all must go most particularly to his widow and four surviving children.

## HEAD OFFICE

### Mr. W. E. Colomb

Mr. W. E. Colomb, who served the Company for 46 years with only two days' absence for sickness, was entertained to a farewell luncheon at the Rubens Hotel on 27th April by friends and well-wishers from the Legal Department and I.C.I. Divisions.

Speakers at the luncheon were Mr. Coppin (secretary of Plastics Division), Dr. Paterson (Nobel Division), Miss Marsh (Dyestuffs Division) and Dr. Ball and Miss Newton (Legal Dept.).

Letters of appreciation and good wishes for the future received from Billingham Division and General Chemicals Division were read out, and after the luncheon Mr. Colomb was handed a cheque by Mr. Bingen.

Mr. Colomb joined the Nobel Dynamite Trust Company as a junior clerk in 1905; in 1919 he was accountant to the Alliance and Australian companies; in 1920 he became secretary of King's Norton Metal Company, and in 1922 he joined the staff of Mr. Morris, then solicitor to Nobel Industries Ltd., on patent and trade mark work, since when he has been entirely engaged on patent work.

### Mr. George A. Black

His many friends in I.C.I. will have learnt with great sorrow of the sudden death of Mr. George A. Black on 8th April in his 74th year.



George Black combined a kindly and friendly disposition towards his fellow men, which found expression in Masonic and Church activities and in many other good works, with a rugged independence of judgment and a power of forthright expression which earned him the respect of the upholders of both sides of an argument.

He was educated at Woodford Borough School and served his business apprenticeship in the hard school of a produce

broker's office in Mark Lane, where he worked until 1916, when he joined the R.A.S.C. and was soon promoted Lieutenant. From 1919 to 1926 he was successively Secretary of the Sulphate of Ammonia Export Traders and Sales Manager of the British Sulphate of Ammonia Federation. On the formation of I.C.I. he was appointed Sales Manager in the nitrogen fertilizer department. He retired from the Company's service in 1942.

"His worthy deeds did claim no less than what he stood for."

## ALKALI DIVISION

### Distinguished Pensioners

During the winter months Alkali Division has lost through retirement ten valuable employees whose total number of years of service with I.C.I. and its predecessors is over 482.

Mr. W. Malam, who by 1928 had reached foreman level, spent the last eighteen months of his forty-seven years as head foreman of the General Services Department, Winnington, while Mr. F. L. Thornton, a manager at Lostock Works and a former stalwart of the Engineering Department, was only four years his junior in years of service at the time of his retirement.

Of the ten of whom we write, Mr. Joe Lawrenson holds the proud record of 53 years 10 months' service. Starting his working life in 1897 as an apprentice fitter, Mr. Lawrenson spent his latter years carrying out supervisory duties, ranging from leading-hand fitter to acting foreman. A close second in length of service is Mr. Charlie Holliwel of Winnington, with 53½ years. Winnington and Wallerscote each claim one of the new pensioners with 50 years' service: these are Mr. Sam Hough of Winnington Oxygen Stores and Mr. Harry Jones, who was a distillerman at Wallerscote for his last four years at work and who unfortunately retired a year before the normal time because of ill health.

Forty-nine out of our aggregate of 482 years were served by Mr. George Henry Littler, who has been a shift process man since 1903. In 1928 he was made one of the first chargehand burners who were in at the start-up of the Rotary Lime Plant. An Alkali Division waterman is one of this distinguished band of new pensioners: Mr. Jack Siddall retired after 47 years' service, most of which was spent afloat. In 1938 he was appointed Foreman Captain, and he commanded five different steamers in succession until, in February 1949, he assumed command of the modern diesel vessel *Wincham*. Mr. Tom Burrows of Winnington Crystal Plant and Mr. Tom Dean of Lostock Works complete our list with 45 years' service each.

## Art and Handicraft Competition

Nearly 1100 people attended the Art and Handicraft Exhibition held at Winnington at the beginning of April. The exhibits on view were the entries for the Art and Handicraft Competition, held by the trustees of the Lawson Memorial Fund on the suggestion of the Wallerscote Works Council. The competition was open to all, irrespective of age and place of employment, and there were four prizes in book tokens of £4, £3, £2 and £1. Visitors were given an opportunity of voting on the merits of the exhibits, although the trustees decided finally on the winners.



*A view of the Art and Handicraft Exhibition*



Prizewinners and entries were:

1. Mrs. S. Leicester (Wallerscote Works): crochet and drawn thread work afternoon tea cloth.
2. Mr. N. Bowen (Engineering Department): decorative wrought iron mirror frame.
3. Mr. W. Melville (Research Dept.): model jet condensing horizontal engine.
4. Mr. J. Dickenson (Supply Dept.): pen drawing of York Minster.

The Lawson Memorial Fund was raised by employees of the Alkali Division to perpetuate the memory of Mr. D. R. Lawson, an ex-member and ex-chairman of the Division and for the two or three years before his death in 1947 the Main Board Director responsible for the Heavy Chemical Group. The fund has been used to further schemes of an educational nature, and in the past two years the competition has taken a literary form.

### *Darts Championship Finalist*

The Fleetwood Works darts team captain, Mr. Dick Eustace, who is also Lancashire and Cheshire champion, played in the finals of the *News of the World* individual darts championship of England and Wales at the Empress Hall, Earl's Court, on Saturday, 21st April.

In the draw for opponents Dick Eustace was drawn against Mr. J. Boynton of the Fox and Hounds Inn, Pickhill, Yorkshire—another War of the Roses.

He lost the first leg but won the second with a double 19, taking 32 arrows to make the score. In the third leg, however, with a substantial lead and wanting only a double 16 when his opponent needed 109, Dick Eustace made his first mistake since the competition opened. He missed with his first and second arrows and got only 7 with his third. While he was trying to repair the damage, his rival completed his score and Dick Eustace lost by two games to one.

### *Mr. H. F. Brown*

It is with deep regret that we report the death on 21st April of Mr. H. F. Brown, who was, until his retirement three and a half years ago, manager of our Wallerscote Works.

On finishing his formal education at King's School, Chester, and Rossall School, Fleetwood, Mr. Brown served his time at the Soho Foundry, Preston, and later with Galloways of Manchester. On the completion of his engineering training he joined the staff of Brunner, Mond & Co.

At the outbreak of the first world war he joined the Royal Fusiliers and was taken prisoner in July 1916 on the Somme. He remained a prisoner of war until he was repatriated under the exchange scheme through Holland in 1918. He rejoined the Engineering Department at the end of the war and, fairly soon afterwards, visited America to obtain data on silicate manufacture. He also carried out design work in the Engineering Department for the construction of Billingham Works. In early 1921 he was transferred to the Construction and Repair Department and assisted in the construction of Wallerscote Works. On its completion in December 1926 he became Works Maintenance Engineer, and except for a period of six months during 1928, when he served at Fleetwood, the rest of his career was spent at Wallerscote, where he became deputy works manager in 1939 and finally works manager.

Mr. Brown had considerable outside interests, including

golf, beekeeping and the breeding of goldfish. He was a member of the Sandiway Golf Club committee and was for many years chairman of the Owley Wood Social Club. His many friends will learn with sorrow that his retirement has been so short.

## **BILLINGHAM DIVISION**

### *£100 Award for New Welding Process*

Welding is not just a way of earning a living for Andy Long and Alf Blacklock of Prudhoe. They are interested in it as an engineering process, in its technicalities and applications. Recently they have developed an idea to improve the process for welding a layer of hard surfacing metal on to a softer metal. For this idea I.C.I. has paid them £100 each.



*Mr. Alf Blacklock and Mr. Andy Long*

For years engineers have been investigating ways and means of lengthening the life of metal surfaces which are subject to severe wear, by coating them with a layer of harder metal. The common process used was the normal method of welding, using an acetylene torch or electric arc, with the hard metal in rod form. This has never been altogether satisfactory because, although it did the job efficiently, the rippled surface of hard metal which it left had to be made smooth and reduced to the required thickness by a long and tedious grinding operation.

About 1949 there was an important development in this field when a proprietary brand of hard surfacing metal in powder form was placed on the market by an American company. The same company also developed a spray gun for applying the powder, but although the powder was obtainable in this country, the guns were not.

Andy Long and Alf Blacklock got to know about the new powder. As experienced welders they were quick to appreciate its possibilities. Such a process would allow a smooth, even coating of hard metal to be built up to any thickness which, except in special cases, would do away with the necessity for grinding. True, the guns were not yet available, but with their long experience of welding they thought they could develop such a gun themselves. With the help and technical advice of their workshops manager they set out to find the answer. At the end of three months not only had they designed a new process of spray welding but it was actually more efficient than the original spray-gun method.

Like many of the most successful inventions of our day, the Long-Blacklock process is amazingly simple—now! The



apparatus consists of an ordinary oxy-acetylene torch with a hole in the top of the gas tube. Over this hole is fitted a container with a tap at the base. That's all. To spray-weld, the container is filled with metallic coating powder, the gas is turned on, the torch lighted, and the container tap opened so that the powder enters the gas tube. The minute particles of metal mix with the gas, pass through the flame, melt, and are deposited on the surface to be coated as a spray of molten metal.

Experiments have proved that by this process it is possible, when hard coating, say, mild steel, to control the thickness of the deposit from ten-thousandths of an inch to one-eighth of an inch or more. Technical analyses which were carried out by Billingham's metallurgical experts showed that the coating of hard metal was far more efficiently welded to the parent metal than when the normal spray gun was used.

Many parts of machinery subject to heavy wear and abrasion have already been treated, and it has also been proved that the life of the coated surfaces has been increased by at least four times. Lime Division are now trying out the idea on their heavy quarrying machinery at Buxton.

An application to patent the Long-Blacklock process has been filed, and in the meantime I.C.I. have put them in touch with an outside firm who may be interested in it commercially.

### Dr. H. S. Hirst

Dr. H. S. Hirst, who has been chairman of the I.C.I. Inter-Divisional Sulphuric Acid Panel, has been nominated to act as Technical Assessor to the board of the new company, United Sulphuric Acid Corporation Ltd., which is to erect a new plant, probably on Merseyside, to make 150,000 tons of 100% sulphuric acid, using anhydrite as the raw material. Dr. Hirst was until recently chairman of a technical and commercial sub-committee of the new company. He will act as the technical link between the new company and I.C.I., who have agreed to provide the information necessary for

design and to supervise the erection and starting up of the factory.

Joining Billingham in 1926, Dr. Hirst first worked on the plant. He later took up research work and subsequently joined the Alkali Group. In 1931 he was transferred to the Gaskell-Marsh Works of General Chemicals Division. From 1942 to 1944 he was seconded to the Ministry of Supply, where he held the position of Director of Chemical Defence. From 1945 to 1947 he worked on the new Wilton project. He returned to Billingham to become personal assistant to Dr. Fleck in connection with Scottish Agricultural Industries Ltd. He became deputy manager of the Technical Department at Billingham in 1949.

## DYESTUFFS DIVISION

### Dr. W. J. S. Naunton

Dr. W. J. S. Naunton, head of the Rubber Service Laboratories and a well-known authority on rubber, was recently

presented by Dr. C. J. T. Cronshaw (Group Director) with a desk from his friends and colleagues on retirement.

Educated at Cambridge, Dr. Naunton, after one year's research work with Burroughs Wellcome, joined the University of Munich, where he worked with Professor Einhorn on local anaesthetics. He escaped from Germany after war had been declared in 1914 and joined the staff of the Aeronautical Section of the National Physical Laboratory, where he made his first contact with rubber as proofed fabric for airship construction. He came to Levinstein Ltd. in 1916 as one of the original half-dozen research chemists. He was soon in charge of a Blackley Works manufacturing department, where early experiments in producing rubber accelerators were conducted. The testing of these products necessitated the use of experimental rubber equipment improvised largely from home-made parts. This was the beginning of the Rubber Service Laboratories, which gradually increased in size and efficiency to become one of the world's rubber research centres. They have been the special care of Dr. Naunton since their inception. During the war the armed forces referred most of their synthetic rubber problems to these laboratories.

Dr. Naunton has represented I.C.I. on most of the rubber organisations besides visiting most countries where there is a rubber industry, and at the end of the war he headed two technical missions to study German synthetic rubber.

### Award to Blackley Man

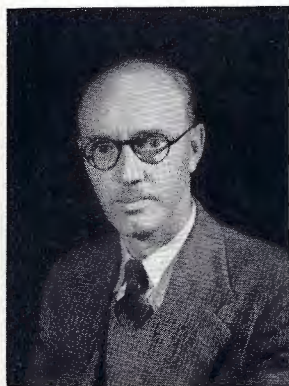
In recognition of his prompt action on 4th November last year, which probably saved the life of a small boy, Mr. Leslie Harrison, who works in the Biological Department, was presented with a cheque from the Society of Protection of Life from Fire by Mr. S. Roberts (works manager) at the Blackley Works Council meeting on 16th February.

While at work in the Hexagon Area, Blackley, Mr. Harrison's attention was drawn to a youngster in a nearby road whose clothing was on fire. He immediately climbed over the railings, tore the burning clothes from the boy and carried him into the nearest house. Meanwhile the Lawson Street Time Office had been informed and the man on duty telephoned for a police ambulance, in which the boy was taken to hospital. We have no doubt his wife and fifteen-year-old son are very proud of Mr. Harrison.

During the war Mr. Harrison, who joined the Company in 1948, served in the Royal Navy from 1942 until 1946, firstly as gunner on transport ships between the U.K. and U.S.A. and then on minesweepers operating from Trincomalee in Ceylon.



Dr. W. J. S. Naunton





### Promising Pianist

A young tracer, Miss Glenys Ellinthorpe, in the Drawing Office at Huddersfield Works shows every sign of becoming a pianist of great merit.

This year she gained second place in the Duet Finals in the Yorkshire Area competition, organised in connection with the Festival of Britain. In February she was chosen to broadcast from Radio Luxembourg in Hughie Green's "Opportunity Knocks" programme. For this she played Chopin's "Fantasie Impromptu," her favourite composition.

Miss Ellinthorpe is now 17, and since the age of 11 has been awarded no fewer than 27 prizes, certificates and medals for her playing. She hopes in due course to obtain her L.R.A.M.

## METALS DIVISION

### The Chairman's Visit

Friday, 13th April, far from being unlucky, marked the first visit to Metals Division headquarters of Mr. John Rogers since he succeeded to the chairmanship of the Company. The occasion was the annual presentation of Long Service Awards to employees at the Division's Midland factories—Allen Everitt, Amal, Brimsdown, Broughton, Elliott, Hughes Stubbs and Kynoch Works and Marston Excelsior, Leeds and Wolverhampton. Other distinguished guests included three Division chairmen (Dr. McDavid of Nobel, Mr. Williams of Paints and Dr. Saunders of Lime), the Chief Labour Officer, and Mr. E. Parker, Midland Regional manager.



*The Chairman congratulates Mr. S. Davenport (Broughton Works) on his 40 years' service award*

The Chairman's "maiden speech" to the Division took the form of the reply to Mr. H. E. Jackson's toast, "Our Guests." Mr. S. E. Hall (Assistant Distribution Manager, Export) proposed the health of the Company and Dr. M. Cook (Division Production Director) replied.

Mr. Rogers then handed Long Service Awards to 333 employees, including 36 with 40 years' service and 125 with 30 years' service. The personal word which accompanied each presentation was greatly appreciated by all the recipients.

### Still Another Trophy

The Kynoch first aid team, who distinguished themselves earlier this year by winning both the Metals Division elimi-

nating round and the I.C.I. First Aid Competition, gained fresh laurels on 14th April.

The third annual competition between Kynoch and Courtaulds Ltd. was held this year at Coventry, and for the third time in succession the Kynoch team carried off the trophy (donated by Dr. Swaffield of Courtaulds and Dr. Marr, Metals Division Medical Officer). The margin of victory was narrow, and, in the words of Courtaulds managing director, "marks are in any case less important than the interest aroused and skill gained in competitions of this sort."

### Mr. Harry Davies

It is with deep regret that we announce the death on 9th April of Mr. Harry Davies, Technical Manager of Landore Works.

Mr. Davies, who was 58, had a distinguished career as a metallurgist, receiving the Bowen research scholarship in 1915 after four years' study in this subject at Birmingham University. He was elected a Fellow of the Institution of Metallurgists in 1946.

Mr. Davies' service with I.C.I. dates from 1920, when he joined Elliott's Metal Co. Ltd. as senior chemist and metallurgist. He moved to Landore Works in 1934. In addition to his technical ability Mr. Davies had a deep interest in the human aspects of industry, and devoted much time to social, benevolent and recreational activities.

He will be greatly missed by his colleagues, all of whom held him in deep respect and affection.



## NOBEL DIVISION

### Exhibition of Models

One of the most successful model engineering exhibitions ever held in the West of Scotland attracted thousands of people to Ardeer Recreation Club on 29th, 30th and 31st March. The exhibition was opened by Mr. E. H. Rigby, Chief Engineer of Nobel Division, who was introduced by Mr. A. Gilmour, president of the Ardeer Recreation Club Model Engineering Section.



*The Model Yacht Section*



In his speech Mr. Rigby stressed the importance of maintaining the skill of the craftsman in these mass-production days. Model engineering, he said, served admirably towards this end. He complimented the organisers on the many models on show and reminded them that model-making could play an important part in industry. Recently, when the 'Ardil' plant at Dumfries was planned, a complete model was made to see how the factory would look.

So large was the exhibition that three halls were used to display the models. In addition to the local exhibits, model-making clubs in Glasgow, Edinburgh and Kilmarnock sent examples of their members' work, and some large industrial concerns, including British Railways and Rolls-Royce Ltd., contributed scale models of their products.



*Interested spectators watch models worked by compressed air*

From a layman's point of view the outstanding exhibit was a scenic layout of Fairlie Station and district. Every detail of this famous Clyde Coast beauty spot was reproduced, and a panoramic backcloth featured the blue waters of the Firth and the islands of Arran and the Cumbraes. The rolling stock consisted of electrically operated oo gauge models, and the exhibit was lent by the Glasgow and West of Scotland Model Railway Society.

Another popular exhibit was Mr. D. S. Clibborn's partly constructed layout of track, locomotives and engine sheds. Mr. Clibborn is now at Westquarter but was formerly at Ardeer. There were many other locomotive exhibits, some completed, some in course of construction. This latter feature was one of the happy ideas of the exhibitors, for it allowed the uninitiated to see how the model-maker proceeded from a piece of rough metal to the finished article.

In the shipping section various models of warships and mercantile ships were shown. Here was an eighty-years-old model of the paddle steamer *Bendigo*, which had been given to the section by Mr. Henry Maxwell and overhauled by Mr. A. Crawford. Another model which attracted attention was a hydroplane which had attained a speed of 52.5 m.p.h. and for which a world's record is being claimed. As an antidote to speed, Saltcoats Model Yacht Club had an inspiring array of yachts, whose white sails brought pleasant memories of blue skies and fair winds on the Firth of Clyde.

Archery may not, at first glance, be akin to model-making, but keen bowmen make their own arrows, and members of Kilwinning Archery Club gave demonstrations of their skill

and answered many questions, the most popular with younger visitors being "What kind of a bow did Robin Hood use?"—and there was a Robin Hood bow to show them.

In an exhibition of such scope it is impossible to touch on every exhibit, but many showed the skill and patience of the maker; there was a very fine model of Major Gardiner's record-breaking M.G., there were beautifully finished model locomotives which worked by the pressure of a button, and finally the jet-propelled cars to thrill young enthusiasts.

## SALT DIVISION

### *Festival Display of Salt*

I.C.I. domestic salt packs have had the distinction of being selected for the Packaging Exhibition at the Festival of Britain. This exhibition is designed to show the attractive and hygienic way in which English manufactures are packed for sale.

Of the many thousands of manufacturers offering to display their products, Salt Division was first informed that the domestic salt packs were on the short list and later asked by the Council of Industrial Design to provide samples for display in the Dome of Discovery and in the Homes and Gardens Section of the South Bank Exhibition.

In the Minerals of the Island pavilion there is a display of the mineral wealth of the country, including coal, limestone and salt, and the various products derived from them. Salt Division has assisted with this display also by supplying quantities of rock salt from the Winsford rock mine.

## SCOTTISH

### AGRICULTURAL INDUSTRIES LTD.

#### *Changes in Board of Directors*

Dr. Fleck, who has been chairman of Scottish Agricultural Industries Ltd. since 1947, resigned from the board of that company on 1st March, 1951, owing to the increasing burden of duties consequent on his appointment as a deputy chairman of Imperial Chemical Industries Ltd.

Sir William Gavin, C.B.E., who was appointed chairman in succession to Dr. Fleck, has been a director of the company since 1932. In addition to being deputy chairman of I.C.I. Central Agricultural Control, Sir William is a director of the Agricultural Mortgage Corporation and of Strutt and Parker Farms Ltd. He was Chief Agricultural Adviser to the Ministry of Agriculture during the late war, is a member of the Potato Marketing Board, of the Council of the Royal Agricultural Society of England, of the National Institute of Agricultural Botany and other agricultural bodies. He is governing chairman of Lord Wandsworth College, Hampshire, which aims to give a public school education with a rural bias.

Sir William Gavin was educated at Uppingham and Trinity College, Cambridge. He represented the university at athletics and cross-country running. In 1917 he was seconded from the R.N.V.R. (Auxiliary Patrol) to become Deputy Director of the



*Sir William Gavin*



Army Cattle Committee, Director of Flax Production 1918 and Director of Land Reclamation in 1919. He has served on numerous Government committees and was chairman of the Jamaica Banana Commission (1936) and the Agricultural Mission to South America (1948). He received the gold medal of the Royal Agricultural Society for research in 1912.

Dr. J. W. McDavid, C.B.E., chairman of Nobel Division, and Dr. T. C. Mitchell, of Central Agricultural Control, have been appointed directors of Scottish Agricultural Industries.

### I.C.I. (SUDAN)

#### *Sailing Record*

Two members of I.C.I. (Sudan) staff have sailed their yacht *Venus* from Khartoum to Wad Medani and back in the record time of eight days during their recent annual leave.

Costas Koutsoudis and Alex Trimbali, two young Greeks, accompanied by a friend, Christoforos Gabrieliades, reached Wad Medani from Khartoum in three and a quarter days, breaking the previous record of five days set up by six R.A.F. members of the British Services Sailing Club in 1948.



*The yacht Venus and her crew at Khartoum*

They expected to do the return journey to Khartoum in much shorter time, but a change of wind forced them to tack nearly all the way back from Wad Medani.

They also met with difficulty at the El Kalkol cataract, where the very strong current forced them twice against the rocks, bending the centreboard, and also at the Rufaa rapids, where they had to tow the yacht for about three hours.

The R.A.F. party took ten days to make the same trip.

The 18 ft. light blue yacht *Venus* was built two years ago for about £E200.

### PHOTOGRAPHIC COMPETITION

In view of the big response to last year's *Magazine* Photographic Competition, it is proposed to hold a similar competition this year on the same basis. The competition will be confined

to holiday snapshots taken this summer by I.C.I. employees. The prizes will be £3 for the winner, £2 for the second and £1 for the third. In addition 10s. 6d. will be paid for every photograph published.

Mr. C. R. Wormald, Manager of The Kynoch Press Photographic Studio in London and a former president of the Institute of British Photographers, has again kindly consented to judge the photographs. All entries must be received at the *Magazine* Office, 26 Dover Street, London, W.1, not later than 31st October. The winning photographs will be published in the February issue.

### I.C.I. (INDIA)

#### *Mr. W. A. Bell*

Mr. W. A. Bell, chairman of Imperial Chemical Industries (India) Ltd., retired on 31st March. His retirement coincided with a meeting of directors and divisional managers in Calcutta, and the opportunity was taken to bid farewell to Mr. Bell at a dinner party on 28th March, when his colleagues presented him with a handsome autographed silver cigarette box.

Mr. Bell joined the Company's service in 1926 and was appointed a director of I.C.I. (India) in 1939. The following year he was appointed general manager of the new Dyestuffs Department set up by I.C.I. (India) in Bombay, which shortly afterwards took over the pre-war German dyes business of Chemdyes Ltd. In 1946 he became a joint managing director and in 1948 chairman of the Company.

During his stay in Bombay Mr. Bell commanded the Bombay Light Patrol for many years, and during the war he was appointed Colonel Commanding the Bombay Contingent, Auxiliary Forces (India), which comprised the Bombay Light Patrol, the Bombay Battalion and units of artillery and engineers. In 1945 he was appointed an honorary A.D.C. to the Viceroy, H.E. the late Field-Marshal Lord Wavell, and subsequently to Lord Mountbatten.

Mr. N. D. Harris, who has been a director since July 1946 and joint managing director since April 1950, has been appointed chairman of I.C.I. (India) in succession to Mr. Bell and also chairman of the Alkali and Chemical Corporation of India Ltd.



### JULY MAGAZINE

The July issue has two articles on the Company, both of which should command very general interest. The first is an account of our long-standing trading connection with China—now virtually at a standstill—and of how this trade was built up. The second tells, largely through the medium of pictures, just how The Kynoch Press prints the *Magazine*. It deals with each successive stage from the moment when the copy first reaches the printer.

Next comes a witty contribution from Mr. W. D. Guttmann of Paints Division. He relates his camping experiences. Lastly, Mr. L. H. F. Sanderson gives an account of a recent visit to the Andes, and describes some of the ruins of the ancient Inca civilisation.



# ASCENT OF NAPES NEEDLE

By Elizabeth Marsh (Nobel Division)

(Photos: Abraham Ltd., Keswick)

**T**HE Napes Needle is a unique pinnacle of rock famous throughout the Lake District and far beyond. Standing away from the main slope of Great Gable with the crags of Needle Ridge rising up behind it, the Needle points to the sky like a huge granite finger. On either side is a steep narrow gully, and in front the fine red scree of Eskdale granite dotted with large boulders descends suddenly in a single sweep to the valley far below.

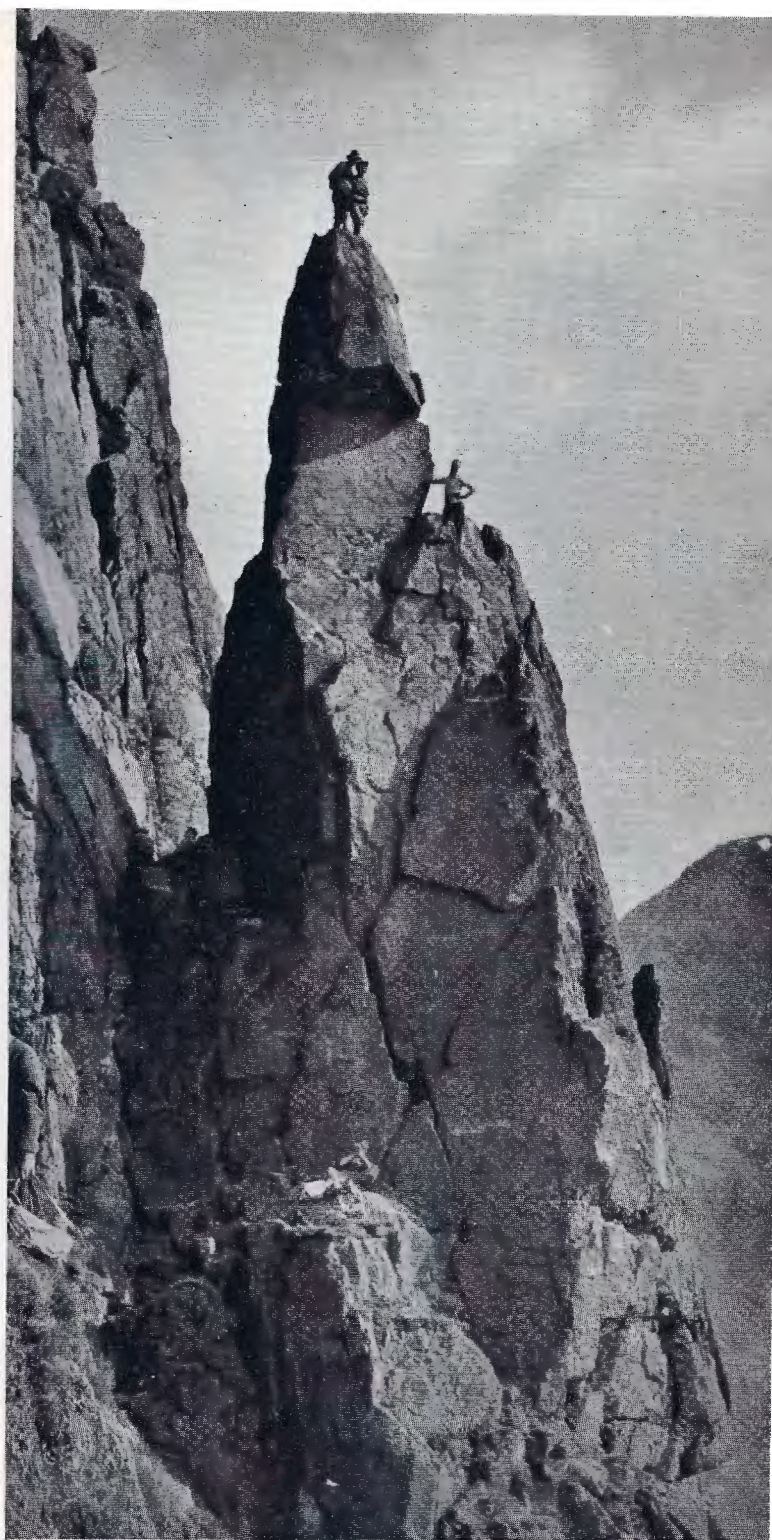
My sister and I had seen picture postcards, photographs, etchings and sketches of the Needle; we could draw it accurately without ever having seen it, for we knew every line of it by heart. So when the day came on which we were taken to see this famous rock we were greatly excited.

We set off from Seathwaite (a tiny huddle of houses and farm buildings at the head of Borrowdale, shut in by the surrounding fells which rise sharply on all sides) and we fairly danced along the mile of rough track leading to Styhead Pass. As we started up the steep path leading to Styhead Tarn our pace slackened considerably; part of the way, indeed most of it, is sheer slogging—the view lies behind the climber and there is very little scrambling to relieve the monotony. It was a warm day, the sweat ran off our faces in a continuous trickle, we puffed and panted, indulged in numerous rests, and at last reached the thousand-foot boulder. Here we each laid a pebble on the cairn and after yet another sit-down resumed the climb.

To our joy we now found the path much easier. The ground was a little boggy, giving a slight spring as we walked on it, and a view had suddenly appeared as if by magic as we topped what had been the skyline on our way up. On our right Great Gable stretched up and away from us, and as we saw the grey scree of Aaron's slack marked white with nail-scratches showing the short route to the top of the mountain, we repeated the silly jingle:

I wish I knew who Aaron was,  
Who put down all that slack—  
I'd throw him in to Styhead Tarn  
And hope to break his back.

Ahead lay the massive shape of Great End, and the clear, cool beck running down into Styhead Tarn made a refreshing companion. All about us was the soft green of sphagnum



NAPES NEEDLE from the "Dress Circle"

moss, starred with butterwort, sprinkled with sundews and spiked with rushes.

Soon the path became much stonier, and by the time we reached Kern Knotts crags we were jumping from boulder to boulder following the nail-marks. After lunch we set off again and found that the rocks which had paved the way under Kern Knotts began to peter out and the fine red scree started. This part of the climb is called Great Hell Gate, a name which appealed to us children immensely. Passing between the two huge boulders which form the Gates of Hell, we started on the Gable traverse.





*Seathwaite Valley*



*Styhead Tarn*



*Styhead Pass*

Perched dizzily about two-thirds of the way up the mountain, this track is about a foot wide and its angle is almost the same as the slope of the hillside. We crossed with very little trouble, the only difficulty being that my young sister would stop in the most perilous parts to admire the valley lying over a thousand feet below.

All this time the mist had been coming down, and when we reached Needle Gully we were walking in cloud. We did see the Needle towering above us, but only in bits and pieces as the grey mist swirled slowly round it, revealing first one part and then another. The sight so impressed me—even now I can see it as clearly as if I were still there—that I swore a dreadfully solemn oath of the kind which children alone know how to swear. It was that one day, when I grew up, I would climb the Napes Needle.

The next time I saw the Needle was the following summer, when I was eleven years old. My father and I were sitting in the Dress Circle, a craggy ledge above the gully where everyone goes to watch the climbing, both on the Needle and on the Ridge behind it. We were to meet the guide there and he was going to take me up one of the easier rock climbs on Gable. After Sutcliffe had arrived we sat for a few minutes gazing at the Needle as it soared up into the blue sky, the tiny crystals of mica sparkling in the sun. Then as my father reached for his camera and started calculating distances, exposures and what-not, the guide and I scrambled down and across the gully to the rocky platform from which Needle Ridge and the ordinary route up the Needle are started.

We roped up, and while Sutcliffe straightened out a snarl in the line I stood looking at the Ridge. The first pitch seemed to be a little difficult; according to the guide-book, the climb, though long and fairly exposed, was ideal for beginners. But as Sutcliffe shook out the rope he said quite casually: "I think we'll do the Needle."

"Oh!" I said, and tried with all my might to keep calm.

I pulled myself together and with trembling hands put the rope over my left shoulder, round my back and under my right arm, and paid it out to Sutcliffe, who was slowly and surely making his way up the rock. He was a beautiful rock climber, moving surely, smoothly and gracefully from hold to hold, perfectly balanced, making it seem so easy and inspiring his second with confidence.

The Needle is wide at its base, and the first pitch begins with a diagonal traverse from left to right across the face in the direction of the arete. About half-way Sutcliffe stopped, belayed, and pulled in the slack, and it was my turn to climb. The holds, though quite safe, were small and polished smooth by the nails of countless climbers. Indeed, it is requested in the guide-book that people climbing the Needle should do so in rubbers, as the holds are wearing away.

On reaching the belay I tied myself on to the rock, and Sutcliffe set off again to the arete and then up it to a big ledge which forms the shoulder of the Needle. This was really the end of the first pitch, but Sutcliffe had broken it half-way so as to keep an eye on me.

I climbed confidently along to the arete, but when I reached it I received a nasty shock. I had not realised that the far side of the Needle drops so far down to the gully, and as I rounded the edge before climbing up to the arete the rock seemed to fall away from under me and I was faced with a sudden sickening nothingness. For a moment I stood there fascinated by the precipice, tempted by the thought of the glorious mad rush to rocks below, and then, turning my



attention to the arete, I climbed up it and joined Sutcliffe on the ledge. The holds up to the shoulder were excellent, small, perhaps, but quite adequate—and just before the ledge there was a beautiful handhold called the Jughandle. It consisted of a rod of rock set in a hollow of the main crag and is well named, for I could put my fingers right round it, just as one holds the handle of a jug.

On the shoulder we met three climbers who were doing the obverse route and they very kindly agreed to look after me, as once Sutcliffe was on top he would be unable to see what I was doing. The next part of the route involves climbing on to a crack about four or five feet from the shoulder. This is done by putting one knee up (bad climbing practice), pulling on a handhold round the corner, just out of sight and rather difficult to find, and struggling to stand on the ledge. The difficulty is that the top of the Needle is a separate block sitting on the main part, forming a horizontal crack right round the rock, and it bulges out above the point where the climber has to struggle up. If he puts his knee too far on at first it is impossible to stand up later because of the bulging rock above him, and if his knee is not far enough on, the bulge pushes the unfortunate climber right off.

One man I knew was so tall and loosely built that he could put his foot on the Mantelshelf, as the crack is called, and dispense with the awkwardness of kneeling on it. Another climber tried time after time to negotiate this tricky part, and in the end he had to climb down with one of his ribs cracked.

Sutcliffe, who knew the Needle well, did the Mantelshelf very neatly. Then he traversed the crack, vanished for a few minutes and reappeared on the top. Flinging the rope round the block under the overhang, he belayed himself on and shouted down to me to start. As I was too small to get my knee on to the Mantelshelf or to reach the crucial handhold, one of the three climbers we had met very kindly gave me a leg up. Again I was too small to rest my hands on the flat top of the Needle as I went along the traverse, so Sutcliffe lowered two loops of rope which he held in very tightly, and by holding on to them I kept my balance. I went round the corner to the Ridge side and saw the soles of Sutcliffe's rubbers just above me. Feeling for the one handhold on the top, I took a good grip of it, pulled with all my strength and I was up.

We must have spent half an hour up there, having our photographs taken and shouting across the gully to my father, who was bursting with pride on the Dress Circle. It was then 4 o'clock, the sun was hiding behind a veil of grey cloud, and it seemed that much of the colour in the valley below had been washed away. The green of the fields had dulled, the water of the lake was steely, and the little bit of sun which pene-



THE VIEW FROM THE TOP of *Great Gable* looking down on *Wastwater*

trated the cloud was reflected in the centre like a cold pale yellow penny.

Sutcliffe wrapped me up in his green tweed jacket and gave me lots of Kendal mint—the kind with rum in it—to warm me up. We climbed down by the Wastdale crack, and although I must have put my hands and feet on the appropriate holds I have no recollection of doing so. On reaching the bottom I stood taking in the rope as Sutcliffe came down, and stared absent-mindedly at the view. The three of us then went down to Seathwaite and ate an enormous ham and egg tea.

When I woke next morning it seemed as though I had dreamed it all. Not until a week later, when I saw the photographs my father had taken, did the truth dawn on me. At the same time Sutcliffe gave me a badge of the Munich Tigers Climbing Club, then very highly regarded by climbers, and an etching of the Needle with some flattering remarks written on the back, and I knew that I had been lucky enough to realise my most precious and secret ambition.





*Fifth Avenue, New York, in which I.C.I. (New York) have their offices at No. 521*

*(Photo: M. Milbourn, Metals Division, Witton)*